THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[Registered as a Newspaper.]

Vol. XXVIII. No. 701.] LONDON, OCTOBER 17, 1876. [28th Year.] Price 6d.

RAMSAY'S NEWCASTLE CANNEL COAL. Analysis—12,000 cubic feet of gas per ton of coal; 28-candle gas; coke 66·70 per cent.; volatile matters 33·30 per cent. Coke of good quality.

RAMSAY'S PATENT CONDENSED GARESFIELD COKE.

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GAS-RETORTS, introduced 1828. FIRE-BRICK WORKS, established 1804. FIRE-CLAY SANITARY PIPES, CHIMNEY-TOPS, and all Goods made of Fire-Clay. The Fire-Clay is worked from Blaydon Main Colliery, is of excellent quality, and no expense spared in perfecting every article. The FIRE-BRICKS (marked "RAMSAY") are to be seen in all parts of the world, and the Works are the most extensive in the Kingdom.

Manufactories—Derwenthaugh, Swalwell, and Hebburn Quay, near Newcastle-on-Tyne.

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(Mixed ready for use).

These Paints are now used in 100 Country Gas-Works, and by all (but one) of the London Gas Companies, on Gasholders, Scrubbers, Purifiers, &c. They will cover tar effectually. Also used by the Admiralty, War Office, Railway Companies, Founders, &c.

They prevent and arrest rust, and protect iron from the action of water, sulphurous and gaseous exhalations.

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MANUFACTURERS OF
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CAST & WROUGHT IRON TANKS FOR DITTO,
And Gas Apparatus of every Description.
Marine, Tubular, Cornish, Plain, Furnace, Saddle, and Range Boilers.

Sugar, Saltpetre, and all kinds of Pans.
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RETORTS SET, AND GUARANTEED TO BURN OFF A CERTAIN AMOUNT OF COAL OR ELSE NO MONEY TAKEN FOR THE CONTRACT.

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Retort-Setters sent to all parts of Europe and America
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FOR THE ENGLISH GOVERNMENT
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AND OF THE DUPLICATE COPY
Presented by Her Majesty's Government to the French Government,
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IMPROVED DRY GAS-METERS

Warranted to Measure correctly & not to vary.

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SILVER MEDAL, PARIS EXHIBITION, 1867.

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LAP-WELDED IRON AND HOMOGENEOUS METAL BOILER TUBES.

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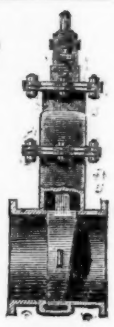
EITHER BLACK, GALVANIZED, OR ENAMELLED HOT WATER TUBES AND FITTINGS,
CORE BARS, COILS, COCKS (IRON OR BRASS),
CHANDELIERS, &c., GAS-FITTERS' TOOLS, GAS TONGS, STOCKS, TAPS, DIES, &c., &c.,
HANDRAIL TUBINGS, IRON AND BRASS, PLAIN OR TWISTED,
TELEGRAPH TUBES OR POLES, &c., &c.

C. & W. WALKERS' DOUBLE-FACED GAS-VALVES.



These solidly constructed double-faced Gas-Valves have taken the place of the old system of the light, single-faced disc, which is too uncertain and unreliable in large bores.

They are guaranteed absolutely gas-tight. They are very massive and rigid, and by improved modes of manufacture they are produced at very little excess in cost over the old light, weak system, which is liable to spring and bend, and become leaky.

The Valve is a rigid wedge of solid cast iron, having two perfectly scraped surfaced facings fitting between the two on the body, which are also surfaced.

A spring in two short halves, and, therefore, not liable to break, is used only for scraping the front facing clean.

The front facing is vertical; the back facing forms the wedge.

At a slight additional expense both flanges are faced to bolt to main-pipes.

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LAMP COCKS AND BRASS FINISHING IN ALL ITS BRANCHES.

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The only Prize Medal awarded for TUBES & FITTINGS.

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By use of which Man-lid, inlet and outlet pipes can be examined and cleansed without loss of gas in crown of holder, or ingress of atmospheric air.

ROOFS, GIRDERS, BRIDGES, AND BOILERS OF ALL KINDS.

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CONTRACTORS FOR GAS PURIFICATION BY OXIDE OF IRON.

The superiority of the material supplied by this Company is generally recognized, and it is now in use in nearly all the London and most of the large Provincial Gas-Works.

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WAS AWARDED, AT THE

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THE GRAND PRIZE "MEDAL OF PROGRESS."

AT LILLE—GOLD MEDAL - - - 1874. AT MANCHESTER—SILVER MEDAL - 1874.

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"The simplest machine of its kind."—*Engineering.*

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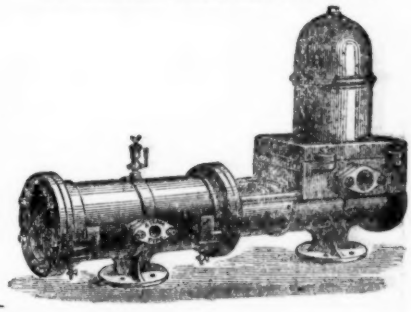
NO TAPPET VALVES OR GEAR.



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THE PRINCIPAL GAS-WORKS IN LONDON, SHEFFIELD, PENISTONE, &c.,

FOR

TAR AND AMMONIACAL LIQUORS.

ONE SELECTED FROM AMONGST MANY TESTIMONIALS RECEIVED BY H. T. & CO.:—

"Ardwick Bridge Chemical Works, Manchester, Oct. 28, 1872.

"Sir,—The 'Universal' Steam Pump obtained from you, and which has been employed during the last six months pumping caustic soda at these works, still continues working satisfactorily,

"Yours truly,

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Attention is called to their Dry Meters in Wood Cases, as used by the principal London Gas Companies. These Meters are especially suitable for seaport towns and for export.

The Company repair or convert every description of Wet Gas-Meters to De Castro and Burton's Patent.

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WITH TALC REFLECTORS AND SELF-ACTING VALVES TO PREVENT DOWN-DRAUGHT;

VENTILATING GLOBE LIGHTS for DINING-ROOMS, LIBRARIES, &c.

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BLACK AND GALVANIZED BARREL COMPO AND TIN PIPE.

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Drawings and Prices upon application.

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Beg to call the attention of MANAGERS and DIRECTORS of GAS COMPANIES to the following letter which they have lately received.

COPY OF LETTER RECEIVED FROM MAGNUS OHREN, Esq.

To Messrs. John Wright and Co., Essex Works, Birmingham. *Crystal Palace District Gas Company, Lower Sydenham, S.E.*

Dear Sirs,—In reply to your inquiries, I am glad to state that the use of GAS COOKING AND HEATING STOVES has been a complete success here. We have several hundred in use in our districts. We also find it advantageous to let out Stoves at a small rental. We have now 275 Stoves at rent.

The Stoves you make I can with confidence recommend, having so many in use, and giving satisfaction. I need scarcely point out to you the advantage to Gas Companies to recommend the use of Gas Stoves to their Gas Consumers, even where they do not supply them on sale or rent, as the use of Gas Stoves brings day consumption, and thus the Company make a profit by day as well as by night.—I am, dear sirs, yours faithfully, MAGNUS OHREN.

Size, 25½ in. high; 14 in. wide; 12½ in. back to front.

Price 50s., complete with Pan and Gridiron.

GAS HEATING STOVES

(TERRA COTTA AND IRON).

THE CHEERFUL STOVE.

COOKING STOVES.

BREAKFAST COOKERS.

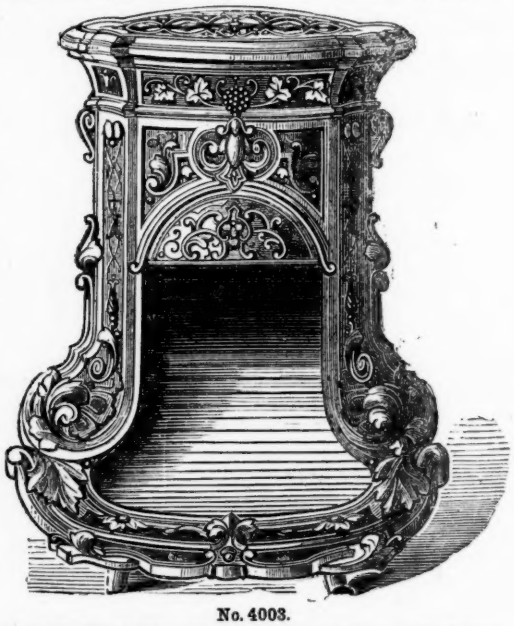
BATHS HEATED by GAS

GAS STOVES

For Boiling, Broiling, Preserving, Heating Flat Irons, and for all other Domestic Purposes.

Gas Companies and the Trade who have not our Illustrated Catalogue are respectfully requested to apply for same.

A LIBERAL DISCOUNT to the TRADE.



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THE CHEERFUL GAS STOVE, with Copper Reflector,

Has all the appearance of a Bright Fire.

PRICE from 32s.

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WET & DRY GAS-METER MANUFACTURERS,

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From "THE JOURNAL OF GAS LIGHTING," Jan. 5, 1875.

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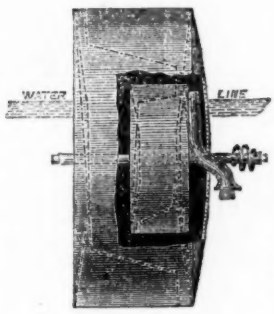

BRITISH ASSOCIATION of GAS MANAGERS, Leeds, 1875.

Inaugural Address of the President, JAMES PATERSON, Esq., F.G.S., of Warrington.

"There are, however, degrees of what may properly be termed excellence; and this leads me to notice one of the most beautiful applications which science has yet devised in the construction of the meter, and which has rendered it an absolutely reliable and unvarying instrument. . . . The object aimed at, and most admirably accomplished, is to change the varying measurement of a varying water-line to an unvarying measure with a varying water-line and annulus."

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It is the ONLY Meter in which reliance can be placed.

It is the ONLY Meter in which the DRUM or WHEEL has been improved since it left the hands of Clegg and Crosley.

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effecting a great saving of time, labour, and expense.

For particulars, price, &c., apply to Mr. E. Price, Inventor and Patentee, Gas-Works, Hampton Wick, Middlesex.

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MANUFACTURE EVERY DESCRIPTION OF

GAS AND WATER FITTINGS;

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PLUTONIC CEMENT,

For Repairing Gas-Retorts in Action, preventing Porosity, and reducing the Deposit of Carbon, is highly commended.

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BELGIAN CLAY RETORTS.

J. SUGG and CO., late ALBERT KELLER, Ghent.—The removal of the import duties on Earthenware permitting the entry of Clay Retorts into England, Messrs. Sugg, of Ghent, beg to draw the attention of the Gas Companies of London, and other Cities, to the very superior quality of the RETORTS manufactured by them. They can be made of any size, in one piece, and of any form. The price will be in proportion to the weight, and very moderate in comparison to their value.

Communications addressed to J. Sugg & Co., Ghent, will receive immediate attention.

FIRE-CLAY RETORTS.

WILLIAM FRASER,

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Owner of the Works at which Fire-Clay Retorts were first made), can supply

RETORTS, FIRE-BRICKS, &c.,

to any extent.

References can be given to managers of above a hundred Gas-Works whom he supplies.

He ships at Charlestown his

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Depôt for STOURBRIDGE and NEWCASTLE FIRE-BRICKS, LUMPS, TILES, and FIRE-CLAY, and every Article suitable for

GAS AND WATER WORKS.

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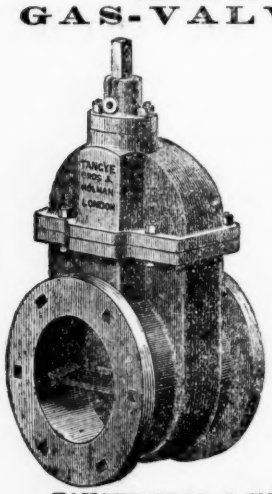
GAS-VALVES.



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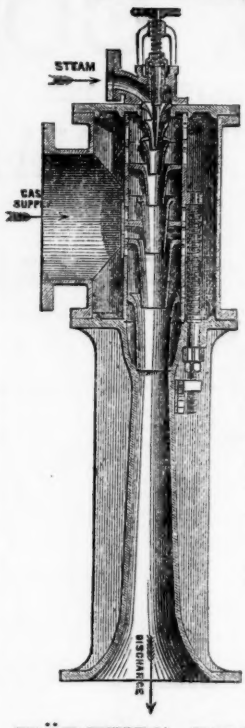

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IMPROVED CLELAND'S PATENT.

Small Cost—Compactness—Perfectly Self-Acting—Self-Regulating—Self-Cleansing—No Steam-Engine—No Attention—No Extra Room Required—No Wear and Tear—No Noise—No Oscillation in Vacuum, or Back Pressure.

UPWARDS OF 200 IN USE.

SUPPLIED TO—

Chartered Gas Co.	Glasgow Corporation.	Hanna, Donald, and Wilson, London.
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Liverpool Gas Co.	Birmingham Gas-Works.	Dartford Gas Co.
Bolton Corporation.	Wakefield Gas-Works.	Exeter Gas Co.
Horsham Gas Co.	Brentford Gas-Works.	Harrogate Gas Co.
Epsom and Ewell Gas Co.	Burnley Gas-Works.	Hertford Gas Co.
Ipswich Gas Co.	Guildford Gas-Works.	Waterside Gas-Works, Todmorden.
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&c., &c., &c.

E. KÖRTING'S PATENT STEAM-JET REVIVIFYING BLOWERS FOR THE PURIFYING MATERIAL.

SOLE LICENSEES FOR

W. CLELAND'S PATENT STEAM SCRUBBER,

Combining small cost and thorough efficiency, with absence of any mechanical means and necessity of renewing the scrubbing material.

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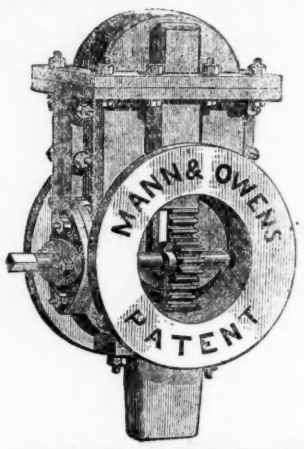
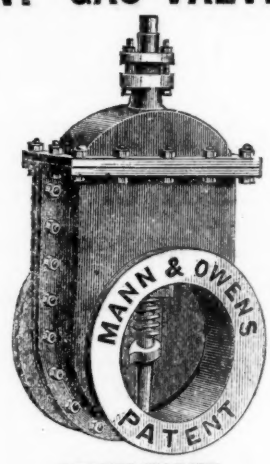
SOLE AGENT FOR ENGLAND AND WALES.

MANN & OWENS' PATENT GAS-VALVE.



RACK AND PINION VALVE.



SCREW VALVE.

The advantages of this Patent Valve over all others yet introduced are, that it is always as tight as the best wedge or spring valve, without the possibility of setting fast or becoming suddenly leaky. The surfaces not being in contact during the operation of opening or closing, leakage through wear and tear is avoided.

The Gas Engineer will not fail to see the importance of such a valve in connexion with his purifying apparatus, particularly in the case of large sizes.

The slide being operated either by a screw and nut, or by a pinion and rack, a cam bearing upon a plane, cast on the back of the Valve, forces it against the face, and renders the escape of gas an impossibility. By a slight turn of the pinion or screw, the slide is released, and brought away from the face, by which means friction is avoided, and the only force required to open the Valve is that due to its own weight.

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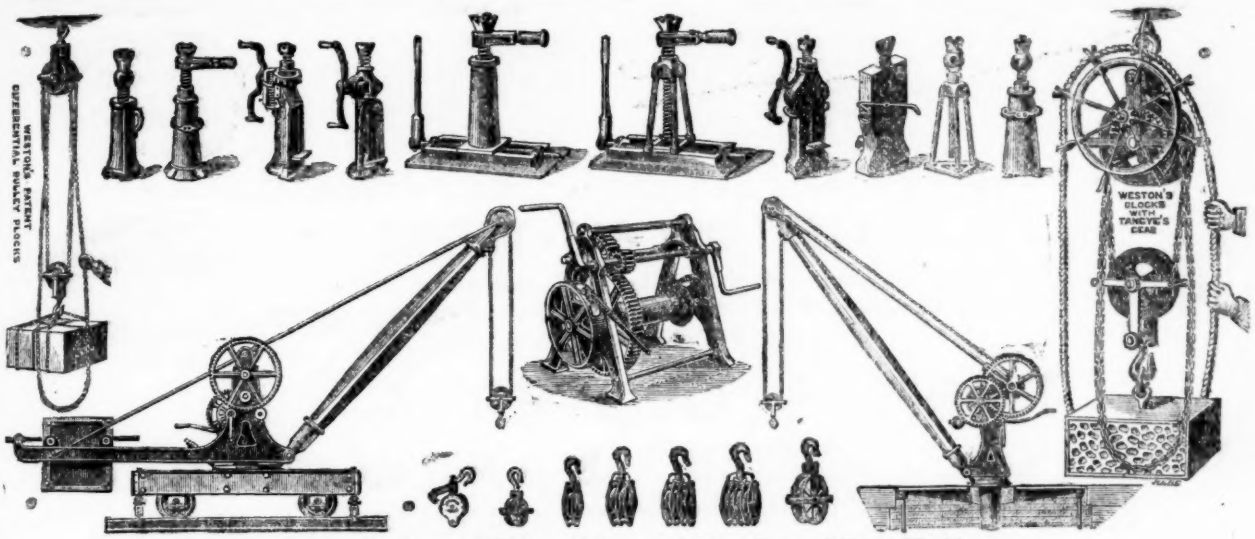

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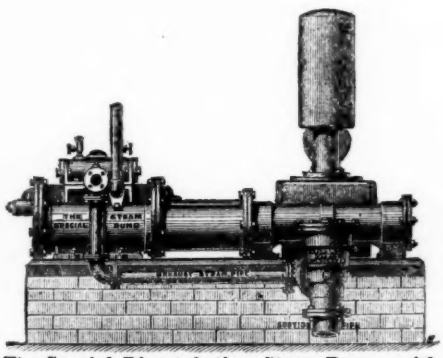

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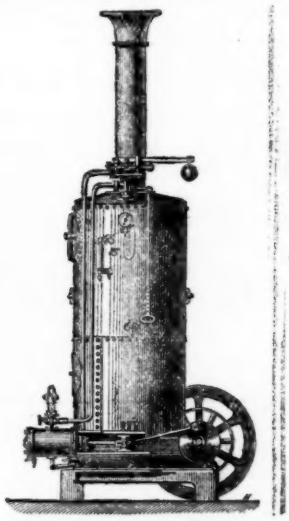
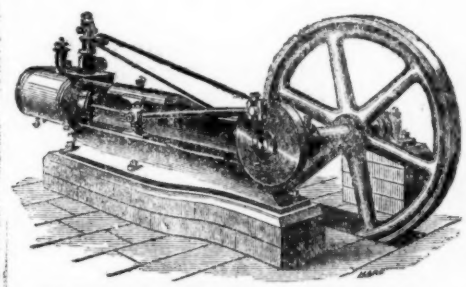


Horizontal Steam-Engine, With Vertical Boiler.



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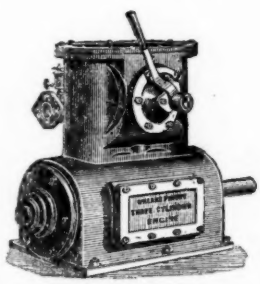
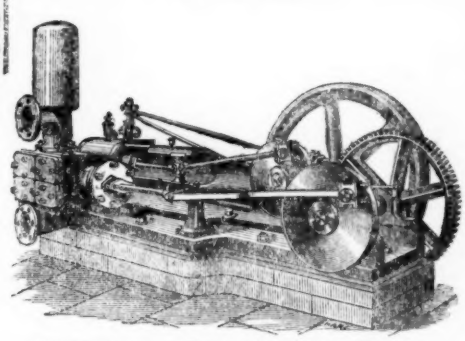


Willans' Patent Three-Cylinder Engine.



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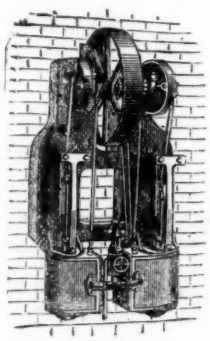
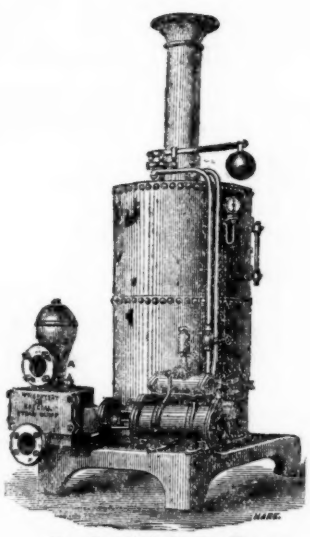


Double-Cylinder Wall Engine



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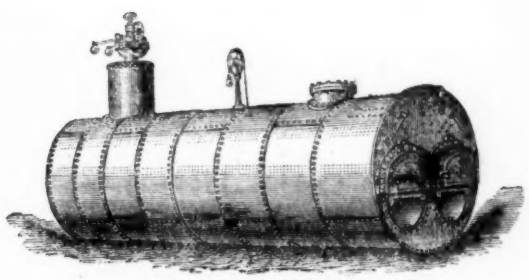

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TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion, must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.

THE JOURNAL OF GAS LIGHTING,
WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, OCTOBER 17, 1876.

Circular to Gas Companies.

THE Metropolitan Board of Works are mysterious. We mentioned, in our last, that a flattering letter from the Board of Trade—written for what purpose we cannot imagine—was referred to the Works Committee, together with an instruction, directing them to consider the whole question of the gas supply of the Metropolis. As will be seen in another column, the committee report that they have nothing to say in reply to Mr. Farrer's congratulatory letter, and that as regards the "whole question," they report their opinion, that, at the present moment, it is not advisable to determine the course the Board shall pursue in the matter; that is to say, it is, at the present moment, an open question, whether, or not, the Board will resume the agitation of the gas question in the next session of Parliament.

We referred, last week, to rumours which had reached us, as to the wishes and designs of the Board, and the truth of these is somewhat confirmed—at all event, as far as regards the initial price of 3s. 6d.—by the adoption of a motion at the last meeting of the Board, instructing the Works and General Purposes Committee to consider the recent Acts of the Commercial, Chartered, and South Metropolitan Companies, and to examine into, and report upon, "the operation of clauses requiring attention." This is a rather vague direction, but the drift of it is perfectly clear.

As we said last week, an effort will probably be made to reduce the initial price to 3s. 6d. all over the Metropolis. It is curious to see that the Commercial Company are, so to say, selected for attack. That company have always been represented at the Board, and their Act of 1875 was passed with the full concurrence of the Board. Its success was hailed with acclamation. It brought the late Mr. Newton honour, and something more. But the legislation of the past session advanced by a stride. Auction clauses were added to the sliding scale, and 3s. 6d. was fixed as the initial price in the case of the South Metropolitan Company. Hence the desire of a majority of the Metropolitan Board to re-open the whole question, with the view of fixing sliding scale, auction clauses, and 3s. 6d. for initial price on all the Metropolitan Gas Companies. An effort to effect this object will, we have reason to believe, be made, and the companies, as we said last week, must be prepared for it. It stands to reason that the Commercial and Chartered Companies cannot alone be attacked. Any new measure must be general, affecting all the Metropolitan Companies alike, and therefore we anticipate the re-introduction of the Regulations Bill, modified in the way we have mentioned. The Purchase Bill also, as we hinted last week, may again be brought forward, but, it need hardly be said, with no possible chance of success. Parliament, we know, will never entrust the Board, as at present constituted, with the administration of a profitable undertaking like the gas supply of the Metropolis. When Lord Camperdown has succeeded in reforming the Board, it will be time to speculate on the possible extinction of the companies. To-day their continued existence is secure, and may be made so for years to come, if they are true to their own interests, which, of course, include the interests of the public.

We announced, some weeks ago, the leading feature of the accounts of the London Gas Company, but give to-day, as usual, the detailed statement. It is gratifying to find that, notwithstanding the reduction in price, made at the beginning of this year, the company pay full dividends out of the profits of the half year, and then have some £5000 to dispose of. On making a comparison with the accounts for the corresponding half of last year, we notice a considerable increase in the business of the company. The make of common gas in the last half year exceeded that of the corresponding half of 1875 by 33 million feet. We cannot ascribe this increase altogether to the reduction of price, but there can be little doubt that cheapness tends to promote consumption. We are sorry to think that there is no immediate prospect of a further reduction, but the reserve-fund will now be equal to a year's dividend on the ordinary capital of the company, and, if coal should rule cheaper next year, another small reduction may be possible.

The announcement of the prospective reduction of price by the Chartered Company, has naturally been received with the greatest satisfaction, by all but the Metropolitan Board of Works, who are silent, and, it may be, sulky, on the matter. Nothing disappoints an agitator so much as the removal or abolition of his grievance, and the announcement is a sore blow to the aspirations of the Metropolitan Board. We stated, last week, that the reduction would diminish the company's income by, at least, £111,000. We do not call this "a present made to the public," but it certainly is "a pecuniary advantage to the consumers." What we wish to point out is this: The Metropolitan Board propose to raise by rates, this year, £446,000, and, in all probability, they will require a like amount next year. Now, a reduction of threepence per thousand feet in the Chartered Company's district will just about amount to a remission of one-half the taxation inflicted by the Board upon that district. From this point of view, the reduction is of great importance to the gas consumers affected.

The report of Professor Williamson, the Chief Gas Examiner, is a very gratifying document. There was a time, we regret to say, when the reports of the Chief Examiner were looked on in some quarters with great suspicion. It was well known that Dr. Letheby had, at some time or other, been consulted by, or engaged for, every Metropolitan Gas Company; and we are sorry to say that there are those who believed that, in his official capacity, Dr. Letheby still held a brief for the companies. We have seen him called in print the "Chief Excuser." Grosser injustice was never done to a high-minded man. Our business to-day, however, is not to defend the memory of Dr. Letheby. The present Chief Examiner has never, we believe, received a fee from any one of the companies. He has never appeared as a chemical advocate, and he came to his office with his mind perfectly blank on the gas question. His reports, therefore, may be accepted as the unbiassed expressions of a perfectly independent mind. And yet what do we find? Reports, the exact counterparts of those written by Dr. Letheby. We allude, of course, to the judgments and remarks on the appeals made by the companies against the returns of the local examiners. During the past quarter, there has often been an excess of sulphur in the gas sent out from the Fulham works; and the Chief Examiner accepts the explanation of the company, that the purifying plant is not sufficient for the quantity of gas made at the station. The deficiency is, however, being supplied, and no fine has been inflicted. On one occasion, a great defect in illuminating power was reported at one testing-station; but, on investigation, it turned out that the determination was erroneous.

On the whole, the report clearly proves that the two companies who are concerned with this document are honourably fulfilling all

their obligations. The average of illuminating power is considerably in excess of the statutory requirements, and the impurities, with the exception mentioned above, are kept fairly within the limits prescribed by the Referees. We notice that Dr. Williamson speaks of the limits of sulphur and ammonia as prescribed by Acts of Parliament. This is not exactly the case. The Acts give the Referees power to fix the limits, but Parliament has not directly prescribed them.

Before another report is issued, the gas supplied by the Commercial Company will have come under the purview of the Chief Gas Examiner. As regards illuminating power, we know that the gas furnished by this company has always been of excellent quality, but we know little about the impurities of late years. The Referees are, very fairly, dealing tenderly with the company in this respect. In their Instructions for the current half year, they fix no limit for "sulphur" in the case of the Commercial Company, and only direct that the amount discovered shall be recorded. This is quite fair, for the company must be given time to remodel and extend their purifying plant. The limit for ammonia is the same as that fixed for all other companies—viz., two and a half grains in the hundred cubic feet. There will, of course, be two testing-stations—one for the gas made at the Ratcliff station, and the other for the gas made at the Stepney works. Presently a third will be required, for the gas made at the new works at Bromley, and we should not be surprised if the Metropolitan Board wince at the expense of three Examiners for so small an undertaking.

Further than is noticed above, the Instructions of the Referees for the winter half year are of some importance. The hours at which the testings for illuminating power are to be made are no longer fixed. In accordance with the provisions of recent Acts, it is simply said that three tests shall daily be made. Each individual examiner will now, we presume, make them at his own convenience, or as the Metropolitan Board and Corporation of London may direct. We have always objected to fixed hours for the tests, because it gave a handle to some who believe that gas companies have the power to rapidly change the quality of the gas. They have, no doubt, such power in works of small magnitude; but it would be a matter next to impossible to alter the quality of the gas in a short time in such works as we have in and around the Metropolis. It may, we believe, be taken as certain, that the gas of the Metropolitan Companies is of exactly the same quality throughout the twenty-four hours. There was sense in the determination of the first Referees to have the gas tested during the hours of maximum consumption; but the change, as we have said, is of no importance to the companies. The Gas Examiners are most interested, for all of them, we fancy, are occupied in the daytime otherwise than in gas-testing, and now they may be called upon to test the gas at all hours.

The Referees, it appears, have not yet decided on the times and mode of testing for pressure. A self-registering apparatus would be the best to prescribe, but it would be expensive for the gas companies who have to pay the cost (not a small one) of fitting up the testing-stations.

We may, for a moment, call the attention of our readers to the report of Dr. Whitmore, who tests the gas supplied by the Chartered Company to the parish of Marylebone. It is important, when looked at in connexion with the Chief Examiner's report, because the gas is tested at stations very far apart. For example, the official testing-place for Beckton gas is nine or ten miles from Dr. Whitmore's laboratory; and Carlyle Square, where the Fulham gas is tested, must, as the mains are laid, be at least three miles, and probably more, from Marylebone Lane. We get, then, from these two independent examinations, at stations distant one from the other, the loss of power which gas undergoes in travelling. It proves to be small, which shows the excellence of the manufacture, for it is badly condensed gas which deteriorates as it travels. There is a little discrepancy in the returns of "sulphur," but that may be accounted for if Dr. Whitmore uses the Letheby apparatus.

The Corporation of Birmingham, it would seem, publish no gas accounts for this year. We are not surprised at this, and it must not be for a moment supposed, that any reflection is cast on the Town Council when we notice the fact. We may assume, without offence, that the undertaking, up to this time, has not been profitable, and, to say the truth, we do not expect it will be for some years to come. The process of disruption now going on must be embarrassing to the Corporation, and at present it is not clear how much of the undertaking outside the borough limits will be left to Birmingham. Mr. Alderman Chamberlain, M.P., appears to have been deceived in his calculations. It is no great matter, however. The Corporation are supplying excellent gas. They are paying rather dearly for their coal; but, seeing the different quality of the gas, this is not to be wondered at. Large expenses, too, are being incurred for extensions and improvements. In a few years, no doubt, it will all come right; but that grand *boulevard*, we expect, will never be paid for out of the gas profits.

The Licensed Victuallers are a very powerful body all over the country. It is commonly said that they returned the present Parliament, and placed the present Ministry in office. We do not know anything about that; but, supposing publicans are powerful, they may be supposed to be exceptionally so in Liverpool, the most drunken city in the kingdom. The United Gas Company must, therefore, take warning, for the licensed victuallers have entered the lists against them. They are good customers. The glare they make attracts the workman from his murky home, and, in the long run, produces a large profit. But the victuallers fancy they are charged too much for the gas they burn. Their Association have, therefore, subscribed the sum of £50, to assist Dr. Cross in his movement. We cannot shut our eyes to the possibility, that the upshot of the present agitation will be the transfer of the gas undertaking to the Corporation. Now, we believe that body to be sincerely desirous of removing the stain which now attaches to their city. They might assist in doing so, by putting a differential rate on gas supplied to public-houses. *Verbum sap.*

We published, last week, the report of the directors, and the accounts, of the Alliance and Dublin Gas Company, and postponed any remarks that we thought might be called for, till to-day. Few are required. We may congratulate the company on their success, and their nine per cent. dividend; but, to speak candidly, we would rather see the directors, at the present moment, devoting themselves to the cheapening of gas than to the increasing of dividends. Knowing the city and environs well, and fully understanding the opinions of the inhabitants, we would strongly urge on the directors the policy indicated above. There is, they know well, a powerful organization opposed to the company. The next session of Parliament will probably see an attempt made to obtain power to start a competing company. It will not succeed, but it will involve a shameful waste of money, which the promoters of the rival company will have reason to regret. The directors of the Alliance Company could take the wind out of their enemy's sails by further reducing the price of gas, but that does not appear to be their present policy. We know very well that the directors have anticipated their statutory obligations in the way of reduction, but still it must be admitted that 4s. 9d. per 1000 is too much for sixteen-candle gas in Dublin. Let them take our advice to heart, and seriously devote themselves to the task of further reducing the price of gas. If they do so, and succeed, as we feel certain they will, their chance of becoming, in time, a ten per cent. company will be enormously increased. Their aim should be, as they, in fact, acknowledge, to develope their business, and there is only one way in which to accomplish that object. As regards the threatened rival company, we are astonished that the shrewd men of business in Dublin can be induced to entertain the proposal. The money spent in promoting a Bill will all be thrown away, and the money necessarily spent by the Alliance Company in defence of their interests must prevent a further reduction of price for some time to come. We hope the Chamber of Commerce will fully discuss the matter, and in that event we feel confident that they will come to the same conclusion we have.

The Corporation of Rochdale are about to apply to Parliament for power to borrow £150,000 for the extension of their gas undertaking. Some extension is absolutely necessary, and should be made at once; but how far it should go, the Corporation must determine for themselves. We do not exactly share the opinion of those who believe that a period of decadence in our manufacturing industry has commenced, but still we fancy that the past rate of progress will not be maintained. It may be well, then, for Corporations to, vulgarly speaking, draw in their horns, and not incur a debt which is not absolutely necessary.

In noticing the gas accounts of the Corporation of Huddersfield, the week before last, we remarked on the apparent absence of a "depreciation-fund." We now learn, with much satisfaction, that such a fund does exist, and that the Gas Committee set aside £800 a year for its maintenance.

The report of a meeting of the Warrington Town Council, in another column, shows that the purchase of the gas company is confirmed, and we may add that the Corporation have an excellent bargain.

PROPOSED PURCHASE OF THE KIDDERMINSTER GAS-WORKS.—At a meeting of the Kidderminster Town Council, on the 11th inst., the sub-committee appointed to confer with the directors of the gas company with reference to the purchase of their undertaking by the corporation, reported that the directors, though they had no desire to sell their works, were prepared to receive any fair offer on the part of the corporation. The council passed a resolution affirming the desirability of having the supply of gas to the borough under the control of the corporate authority, and authorizing the Improvement Committee to negotiate terms for the purchase of the gas company's undertaking, and to report the result to the council for approval, such report to be afterwards submitted to a public meeting of the ratepayers for confirmation.

Water and Sanitary Notes.

The Town Council of Sheffield, on the motion of Mr. Mappin (one of the "recalcitrant directors"), have appointed a committee to confer with the water company, and negotiate for the purchase of their works and undertaking. The ultimate result can hardly be doubtful, but we do not expect to see an immediate transfer. It cannot be disguised that the affairs of the company are now, and have been for years, in what may be called a "bad way." They have expended a very large amount of capital, and their net revenue is not sufficient to pay interest upon it. Under these circumstances, small dividends have been paid out of capital; but it is quite clear that this could not go on for ever. The expenditure of capital on permanent works is now about to cease, and a certain number of the directors appear to think the payment of dividend out of capital should cease simultaneously. We are inclined to agree with them, disagreeable as the result must be, for a time, to the shareholders. It will be seen that in all about £76,000 have been paid as dividends out of capital. Such capital not having been spent on works, can produce nothing, and will, therefore, remain a load on the undertaking, which the shareholders will be well advised to get rid of in the easiest possible way. But the immediate question is the sale of the undertaking to the Town Council. We do not see why Mr. Mappin should press the question, in the present depressed state of the company's affairs. It does not, however, very much matter. The undertaking, we do not think, will be sold at the price the open stock fetches in the market. The fact is that the works are some of the finest in the kingdom, and, it is admitted, are capable of supplying twice the present population of Sheffield, or, in other words, lasting the town for the next twenty years. Thus, the undertaking cannot be parted with on a calculation of what it now produces. Its prospective value must be ascertained, and then we believe that the Corporation will feel justified in paying some premium on the shares.

Loch Katrine does not suffice for the wants and waste of Glasgow, and new works have just been completed for taking seven and a half million gallons of water daily from the Clyde, for the exclusive use of manufacturers and the extinction of fires along the line of mains. The works are so laid out as to be easily made capable of supplying an additional seven and a half millions per day.

The Town Council of Shrewsbury are anxious to obtain possession of the water undertaking supplying the town, and the directors of the company are not indisposed to sell. The total capital of the company, share and loan, appears to amount to £35,300, all of which has been expended. The average income of the past five years has enabled the company to pay a five per cent. dividend, while providing for all other charges on revenue. It must be remarked that the company have never charged a rental up to their statutory powers. The £50 shares now fetch, in the open market, £55, and, therefore, the special committee of the Town Council recommend that £40,160 shall be offered for the property, on which the company have expended £35,300, which represents a premium of ten per cent. on the share capital. The reserve-fund, which is considered as undivided profits, is to be left for the shareholders. Such is the recommendation of a committee of the Council; but it has not yet been adopted. The meeting has been adjourned for a fortnight.

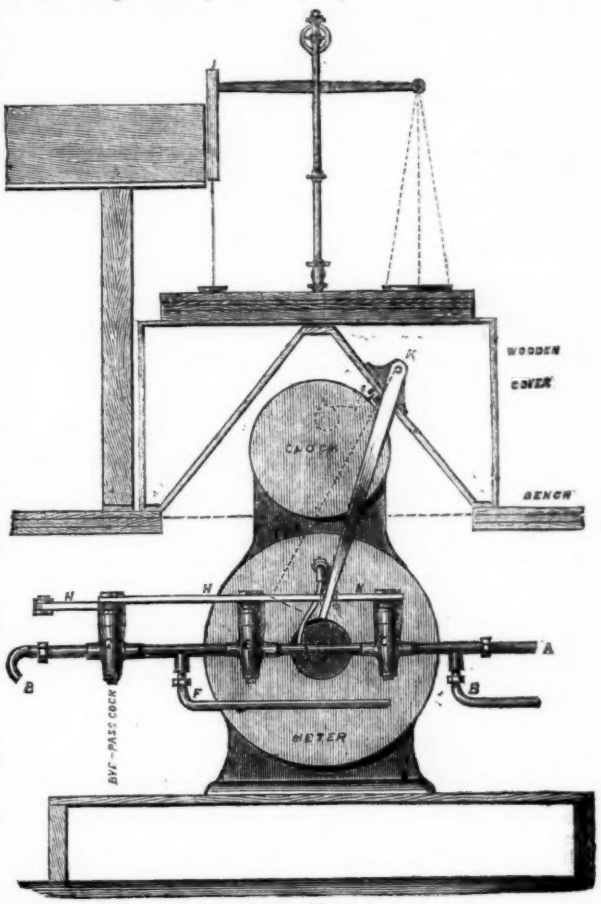
Louth (Lincolnshire) Gas Company.—The half-yearly meeting of shareholders was held on the 6th inst.—Mr. C. Bowmar presiding. A dividend of 10 per cent. was declared upon the subscribed capital.

Reductions in the Price of Gas.—Consequent upon the satisfactory returns, as shown in the balance-sheet for the year ending June 30, 1876, the Abergavenny Improvement Commissioners, at their meeting on the 5th inst., upon the recommendation of the Gas Committee, resolved to reduce the price of gas from 5s. to 4s. outside the limits of the town, and from 4s. 6d. to 4s. inside the limits. The reduction to date from the 1st day of July last. It was also resolved that, as the London and North-Western Railway Company and the Joint Counties Lunatic Asylum are extraordinarily large consumers, a further reduction be made to them of 3d.—viz., to 3s. 9d. per 1000 feet. At Thetford the price of gas has been reduced from 6s. 8d. to 5s. 5d. The directors of the West Ham Gas Company, at their last meeting, decided upon a reduction to 3s. 9d. over their entire district, to take effect from the 1st of January next. The Sowerby Bridge Local Board, at their meeting on the 11th inst., decided to allow 10 per cent. discount on all accounts paid within a month, which is equivalent to a reduction of 5d. per 1000 cubic feet.

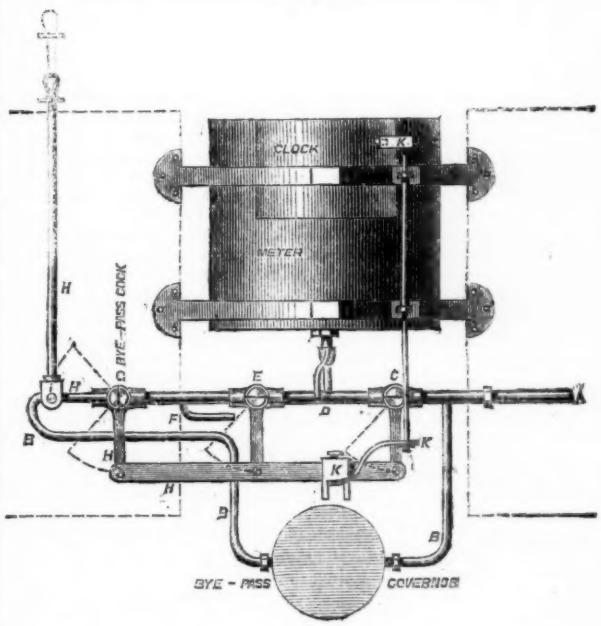
Rating of the Southampton Gas-Works.—We learn from the *Hampshire Independent* that on Tuesday last an application was made to Baron Huddleston, the Vacation Judge, sitting in chambers, on behalf of the Southampton Gas Company, to set aside the award recently made by Mr. Pownall, acting as arbitrator, on an appeal by the company against their poor-law rating, the special rate appealed against being that made in July, 1875, or to stay proceedings thereunder. The award confirmed the increased rating, and saddled the appellants in all costs. His lordship refused the application. On Friday the company appealed against this decision to the divisional court, but they were again unsuccessful, the learned judges dismissing the application without calling on the respondents counsel. The effect of this decision will be that the award of Mr. Pownall, confirming the rate made by the guardians in July last year, will stand. This increases the assessment of the whole of the company's mains and works within the borough from £1925 to about £5000.

WARNER'S SIMULTANEOUS PHOTOMETER-CLOCK AND METER ACTION.

The accompanying sketch illustrates a device of Mr. W. J. Warner's for facilitating the manipulation of the photometer.



Back View.



Plan.

It consists of an arrangement of three cocks at the back of the meter, worked by a lever handle brought through the front of the bench, a lever with an arm attached to the lever-bar of the three cocks, and a short arm at the other end attached to the stop of the clock. By their means the instantaneous stopping or starting of both clock and gas is effected, while no alteration is perceivable in the light, as a governor and bye-pass are opened with the action of closing the meter, or shut by the action of opening it. The operation of starting or stopping is reduced to the simple drawing out or pushing in of the lever handle, and accuracy is obtained in both operations without the extreme care required in the ordinary method.

The arrangement is as follows:—A is the inlet-pipe to the meter; BB is the bye-pass pipe; C is the inlet-cock, shown open; D is a

stop in the pipe between inlet and outlet; E is the outlet-cock, also shown open; F is the pipe leading to the governor; G is the bye-pass cock, shown shut; H is the crank and lever by which the cocks are opened or shut; K is the lever for stopping the clock. When placed as shown in the sketch, the meter is in use, and the bye-pass is shut off by the cock, G, being closed, the inlet and outlet cocks being both open. The object of placing a cock on the outlet *and* inlet is to ensure the instantaneous stoppage of the meter. Now pull out the handle, and the bye-pass cock is opened, while the inlet and outlet cocks are shut, and the clock is stopped; the gas is then bye-passed through a governor, which is provided for the purpose of preventing any alteration in the light. By pushing in the handle again, the gas is turned through the meter, the clock is started and the bye-pass shut at the same instant, the flow of gas to the burner being uniformly maintained through both operations.

It should be mentioned that, to bring the time and gas fingers to zero, it is necessary to check the clock finger by slightly pulling the winding cord; also that the whole apparatus is enclosed, showing the dial only through a neat little frame.

A TREATISE ON THE SCIENCE AND PRACTICE OF THE MANUFACTURE AND DISTRIBUTION OF COAL GAS.

CXIII.

PHOTOMETRY (*continued*).

Another instrument on the same principle as that on which the jet photometer is based, has recently been introduced, and a full account of it was published in the JOURNAL OF GAS LIGHTING a short time back. Of "Sugg's Illuminating Power Meter," the instrument alluded to, it will suffice here to say that it is essentially a contrivance for indicating the consumption of gas during a given time, in a "London" Argand burner, with a flame adjusted to a height of 3 inches; the dial is graduated so as to express the direct lighting equivalent of the gas in standard sperm candles.

Illuminating Power Standards.—There is but little doubt that by far the greater number of errors common to ordinary photometry are traceable to the unreliable nature of the comparison standards at present in use, and to variations of individual observation; and that but little of the total error is due to imperfections in the mechanical and optical details of the instruments. Photometry will never be an exact science until we are in possession of more reliable standards of comparison; but there are many difficulties in the way of fixing, or even finding, a thoroughly trustworthy standard, the indications of which can be entirely depended on. In the first place, the light emitted should be, as far as possible, of the same tint of colour as that under examination, and at the same time the intensity should not be widely different. In the second place, the material used for producing the light must be one which is always obtainable of a uniform quality, and which must be capable of combustion, in such a way as to evolve light in strict proportion to the quantity of material consumed. And, thirdly, in the event of any mechanical contrivance to effect combustion being used, the arrangement must be such as to be under complete control. A minor consideration, bearing on comparison standards, is the desirability of a method of expressing results in a way intelligible to the general public. It has often been a matter of comment, that whereas the candle standard is eminently fitted to be publicly comprehensible, the French method of expressing results in litres of gas would be less desirable, inasmuch as the public would be less able to understand the value of the figures. This objection is easily met, as there is neither at the present time, nor is there ever likely to be, any standard light, the value of which cannot be expressed in its equivalent number of candles. Even if this were otherwise, it is scarcely to be argued that a method which would give increased scientific accuracy should be rejected, because public prejudice was against it, or public ignorance unable to comprehend it.

Erdmann's gas-prover and the jet photometer are, at present, the only well-known photometrical instruments not absolutely requiring actual comparison with any extraneous source of light, in order to obtain an expression of results; for volume of air in the one case, and height of flame in the other, would afford sufficient data to arrive at a conclusion as to actual lighting value. Of the two instruments, it is probable that the gas-prover is the more reliable, the value of the indications of the jet photometer having been already discussed. In addition to these there were, a short time since, great hopes of two methods, which subsequent experience has proved fallacious. The radiometer of Mr. Crookes, the action of which has been found to be more due to heat than to light rays; and the alteration in the electrical conductivity of selenium on exposure to light, discovered by Mr. Willoughby Smith, and subsequently investigated by Dr. Werner Siemens and Professor Adams. The main objection to the latter method was the decrease in sensibility which the selenium suffered by continued exposures to light, requiring it to be kept in the dark for some time before its sensibility was renewed.

With regard to comparison standards, various substitutes for candles have from time to time been proposed. Mr. Crookes suggested the use of a lamp with a wick composed of fine platinum wires, and in which the liquid used for combustion was a mixture of pure alcohol and pure benzol. The scheme appeared at first very promising; but the main objection to its adoption appears to have been that the relative quantities of benzol and alcohol did not remain constant in a given mixture when used for a comparatively short time in the lamp, and the illuminating power was not, therefore, either constant or reliable. Mr. Vernon Harcourt has proposed the use of "standard gas," prepared by impregnating pure hydrogen with the vapour of the lightest portions derived from the distillation of petroleum oil. Although it is quite possible to prepare a gas of any required lighting power by this means, the scheme is scarcely practicable for ordinary use. The best standards of light comparison at present known are undoubtedly the Carcel lamp, burning pure refined colza oil, as used in the French system of photometry, and the modified form of the ordinary Moderator lamp, burning pure sperm oil, as proposed by Mr. Keates, the Consulting Chemist and Superintending Gas Examiner to the Metropolitan Board of Works. Before, however, discussing the comparative merits of either of these standards, it will be well to briefly consider the reasons for considering the present candle standard as untrustworthy. The various gas Acts which have been passed at different times for the regulation of the gas supply of London and the larger provincial towns, have all laid down as the standard of comparison that the lighting power of the gas supplied to the public shall equal a given number of sperm candles of six to the pound, each consuming 120 grains of sperm per hour; as a matter of practical experience it has been found impossible to procure candles which shall fulfil the required conditions, for the experiments of Professors Graham, Leeson, Brande, and Cooper, as far back as the year 1852, proved that the mean consumption of the ordinary sperm candle was about 135 grains per hour, while at the present time the mean amount of sperm consumed by the candles as now manufactured, appears to be considerably *under* the parliamentary standard. The experiments of Messrs. Kirkham and Sugg have also proved it is possible to have candles consuming equal quantities of sperm, and yet evolving varying amounts of light; while, on the other hand, candles consuming varying quantities of material evolved the same amount of light. It should, however, be remembered that these statements do not apply so much to *means* as to *extremes*, and that the variations mentioned are more exceptional than general; still the fact remains that variations of a comparatively large amount do occur, and are always liable to occur even when the greatest precautions to ensure accuracy are adopted. There is also every reason to believe that the method of correcting abnormal variations in the sperm consumption to the standard rate, is not a reliable method, and that even the fundamental axiom "that the amount of light evolved is proportionate to the sperm consumed," is far from being strictly correct. At the same time it must be admitted that a result obtained as the *mean* of several experiments can be taken as a fair approximation to correctness, although *single* experiments with the candle standard should never be relied on.

A lamp consuming sperm, or refined colza oil, appears to be a far more reliable standard of comparison than sperm candles. In Messrs. Kirkham and Sugg's experiments, considerably less variation was found when using a Carcel lamp than when using candles, for while, with the latter means of comparison, a maximum error of 4·6 candles was obtained, the greatest deviation from absolute lighting value in the case of the Carcel lamp, burning pure colza oil, was only 2·3 candles. When the lamp was carefully trimmed and attended to, the greatest deviation was still less, amounting to only 1·69 candles. No experiments were made at the same time with Mr. Keates's lamp, so that we have no opportunity of judging what is its comparative value as compared with the Carcel lamp.

In the foregoing experiments, a peculiar form of photometer was employed, in which four operators could make experiments on the same gas at the same time. This was accomplished by what was termed a "Cross Photometer," which really consisted of four instruments, arranged in the form of a cross, the gas-flame occupying the centre, and thus being capable of observation from each of the four instruments at the same time. Every precaution was used to obtain accurate results, the utmost care being exercised in every respect, and the illuminating power of the gas determined by the English candle standard, the French Carcel lamp, and, in addition, by the Lowe jet photometer. After numerous experiments, Messrs. Kirkham and Sugg sum up their conclusions in the following words, which we quote *verbatim*:—"Let the illuminating power of the gas be determined by the aid of the present recognized photometer, fitted with a Carcel lamp, burning oil of the same quality, and verified in the same manner, as that adopted by the Municipality of Paris as a standard; and let a sufficient number of experiments be made, so as to cover the errors that were known to exist, and the average of these be compared with the illuminating power, as shown by the jet photometer and the duration test, and then the 'mean of comparison' might be taken as the illuminating power of the gas."

As far as our present knowledge extends, there is every reason to believe that a lamp standard is more accurate than the use of candles, although for portability, cleanliness, and facility of manipulation the latter cannot be surpassed. Admitting the durability of a lamp as a standard, it becomes a question for settlement, what oil is the most suitable for use? Mr. Keates has ably considered this part of the subject, and concludes in favour of sperm oil, in which we entirely agree with him. The special suitability of this oil over all others arises from the following considerations:—That it is obtained as a natural product by simple expression, and is not subsequently submitted to any chemical treatment whatever; that it will burn more evenly, and with less clogging to the wick, than any of the vegetable oils; that it is not liable to the variations in character which necessarily attend vegetable oil expressed from seeds of different ages and grown on different soils; and, lastly, that its unusually low specific gravity affords a ready test of purity, excluding, as it must do, adulteration with the commoner oils, all of which possess a higher specific gravity than that of sperm. To these considerations may likewise be added another—viz., the *fluidity* of sperm oil as compared with most of the

vegetable oils, which property, no doubt, materially affects the evenness of combustion in facilitating the ready rising of the oil up the wick. Mr. Keates' lamp and balance are represented in fig. 1. The

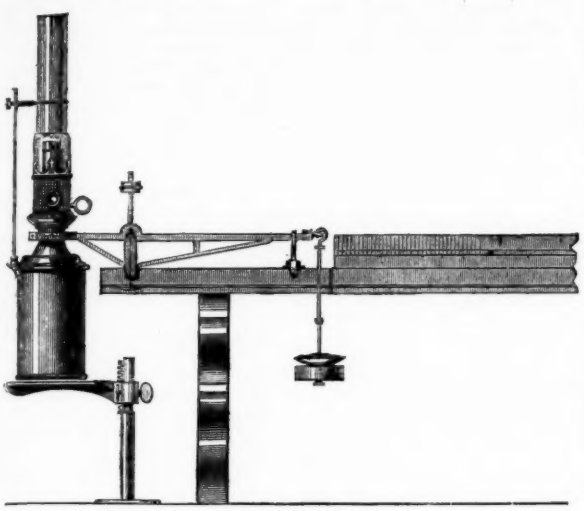


FIG. 1.—KEATES' LAMP AND BALANCE.

total weight of the lamp, when charged with oil and counterbalance, is about 7 lbs. The lamp is constructed on the principle of the common moderator, and the flow of oil is regulated by a series of slots in the wick-holder, covered with a sliding cylinder of thin metal, which is capable of being shifted up or down, and of thus regulating the size of the apertures from which the oil flows. The dimensions of the lamp are as follows :—

	Inches.
External diameter of the outer tube of burner	1·08
Internal diameter of inner tube of burner	0·75
Whole height of chimney	9·45
Height to shoulder of chimney outside	2·35
Internal diameter of bottom of chimney	1·90
Internal diameter of top of chimney	1·20
Regulator of overflow, mean distance below the edge of outer tube	0·50
Mean height of flame burning about 760 grains of oil per hour	2·50

The wick is that ordinarily used for sperm oil, one inch in length, and weighing, in the dry state, 7·60 grains.

It was found that this lamp burned about 760 grains of oil per hour as the normal consumption, giving a light of, as nearly as possible, 10 candles. Any consumption above or below the normal amount was corrected by an ordinary Rule-of-Three sum.

Fig. 2 shows the Carcel lamp and balance on the French system. In this method the lamp is maintained at a constant consumption, and the illuminating power of the gas judged from the quantity of gas required in a given time to produce a light equal to that of the lamp. The dimensions of this lamp are as follows:—

	Inches.
External diameter of the burner	0·9055
Internal diameter (or diameter of the interior air-tube	0·6692
Diameter of the exterior of the air-tube	1·7912
Total height of the chimney	11·4170
Distance from the neck to the base of the chimney.	2·4015
Exterior diameter at the level of the neck	1·8503
Exterior diameter at the top of the chimney	1·3385
Mean thickness of glass.	0·7870

The wick is that quality known as lighthouse wick, and having a plait of 75 strands, 4 inches weighing 55·5 grains. The oil is purified colza, and the consumption regulated to 648 grains per hour.

(To be continued.)

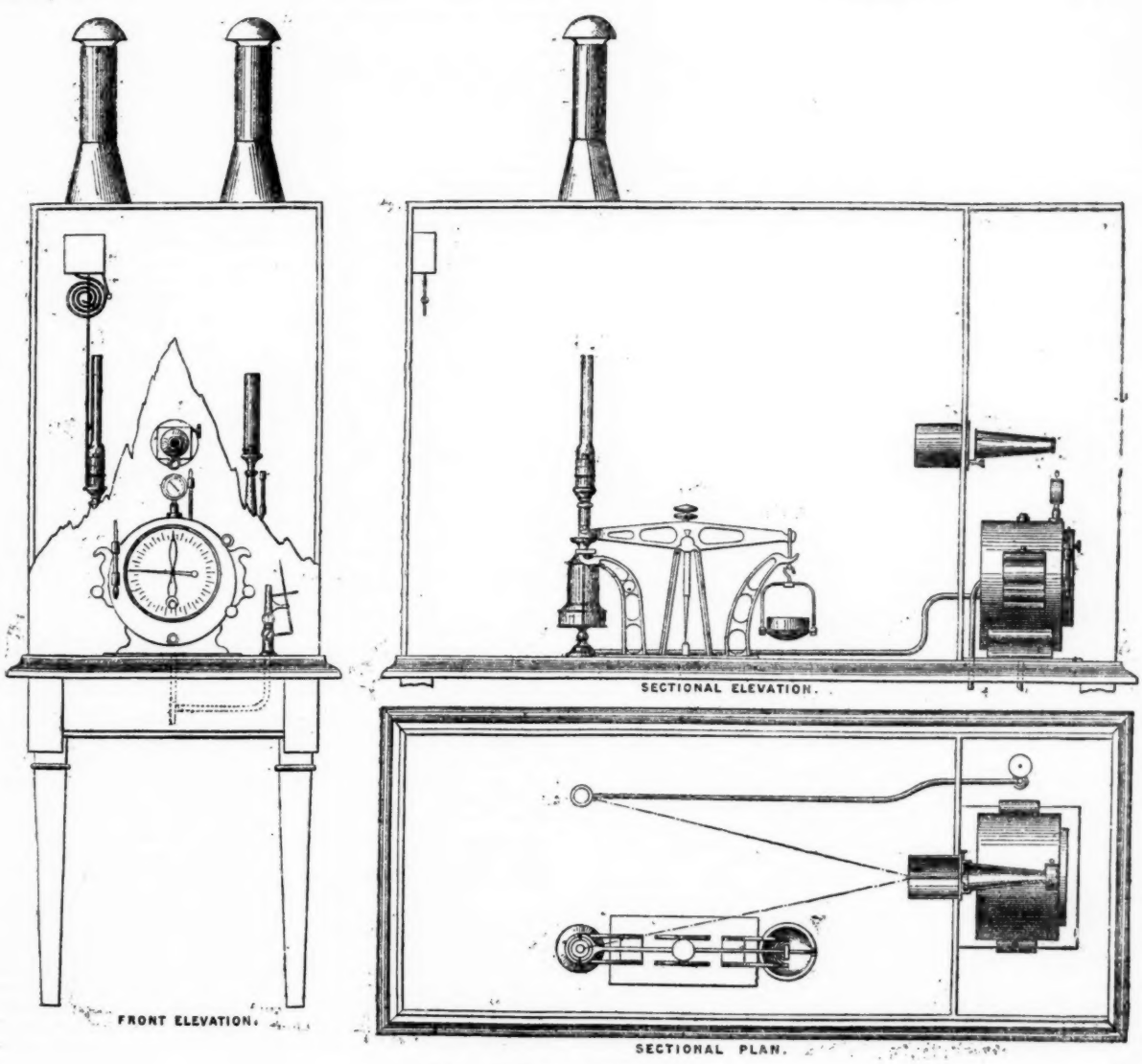


FIG. 2.—FRENCH PHOTOMETRY.

MANCHESTER CORPORATION GAS-WORKS.

With the present number of the JOURNAL we publish a full-page engraving of the general arrangement of the works designed by Messrs. Mangnall and Littlewood, as shown upon the block plan. This is the design for which, as it will be remembered, the first prize was awarded. In future numbers we propose to illustrate other plans; meantime, we continue our description of those not hitherto referred to.

"*Hope.*"—(J. R. Macfarlane, of Southport, and H. Lyon, of Manchester.)

Seven houses are proposed in this design, 180 feet long, placed at right angles to the railway, with rails for the inlet of cannel and for the removal of coke. One house to have on its lower storey the exhausters, boilers, and engines, and retorts are to be placed on the upper floor. All the other houses are retort-houses, of two storeys, the description which accompanies this design stating that the high level of the railway, with respect to the site, may be regarded as doubling its capacity. The total make is stated at 16,500,000. There are 32 purifiers, 31 feet square; and six holders, 200 feet diameter, with three lifts. Estimated cost £560,000.

"*An Anchor.*"—(John Mabon, Harpurhey.)

This design is in three sections. Three retort-houses, each 540 feet by 68 feet, are placed end to end (not in a straight line) contiguous to the Bradford Road and the railway. Each is proposed to have 54 ovens. The make from the whole is computed at 22,800,000 feet, if set with ten retorts and worked at six changes in 24 hours, or at 19,000,000 feet with five changes. If set with seven retorts instead of ten, each section would produce 5,486,000 feet daily.

Horizontal condensers, 68 feet long, with 24-inch pipe, in double rows, 5 feet high; and eight upright condensers, 10 feet in diameter, 45 feet high. Eight scrubbers, 10 feet in diameter, 45 feet high. Sixteen purifiers to each, 24 feet by 24 feet, 5 feet 6 inches deep, one set for lime and the rest for oxide. Total cost estimated at £450,000.

"*Il Penseroso.*"—(W. Cruickshank, Liverpool.)

This design is in four sections, and consists of four double retort-houses, at right angles to the railway siding. Two adjoin the railway, and two are at the end of the first two. They are stage houses, with 448 clay retorts, in ranges of fourteen and settings of eight. The cannel is to be introduced by rail, on curves without turntables, and the coke withdrawn from the opposite ends, by viaduct, to the railway. The condensers are to be formed with six double rows or stacks of 12-inch pipes. Purifiers adjoining each house north and south, for oxide only. Two sets of four, 32 feet by 26 feet, by 5 feet deep. Gasholders, 192 feet in diameter, with three lifts. The make is stated to be 20 million, and the estimated cost £746,000.

"*Crest with Motto of 'Courage.'*"—(Mitchell and Graham, Manchester.)

These gentlemen propose two schemes. The first to make 13,500,000 cubic feet of gas, the retorts being in settings of seven, 24 inches wide and 22 feet long. The second to make 19,347,000 feet, the retorts being in settings of ten.

The principal feature of this design is a building in five spans, 730 feet by 290 feet, with six chimney stacks, parallel with and contiguous to the railway siding. The cannel is to be introduced by rail by means of a viaduct. It is not a stage house, but trucks are to run in front of the ovens to receive the coke, in a narrow vault just wide enough to receive them. Horizontal condensers are placed in a shed at the side of the retort-house. A large purifier-house is proposed for nine sets of eight for oxide and lime combined, and for the larger make 12 sets of four are proposed, 35 feet square. Revivifying cellars, with a lift to a third floor over, to be used as a store for oxide. Storeage is provided for three-fourths of the make, in four large and four small gasholders. The estimated cost is £687,000, and an alternative scheme is suggested at a cost of £632,000.

"*Tuum Est.*"—(W. Hugh Woodcock, Westminster.)

This design has been well considered, and the drawings are remarkably well executed, but the retort-houses and other buildings are not arranged with the symmetry we observe in some of the other designs. There are five retort-houses, each having four ranges of 36 ovens. Three houses are parallel to the railway siding at the north end of the ground, with coal stores adjoining the Bradford Road, and two at the south end with coal stores on the canal wharf detached from them. With eight retorts in each oven, and six-hour charges, the make is taken at 3,283,000 feet for each section. With five-hour charges, the total make would be 16 millions, and with ten retorts instead of eight, 20 millions. Horizontal condensers are formed with 14-inch pipe, four in height, having an area of 84,100 feet, and it is proposed to make one of each pair a water shower condenser, by introducing a 3-inch internal pipe perforated with holes. The scrubbers are 15 feet in diameter and 58 feet high. Forty-eight purifiers, 30 feet by 26 feet by 5 feet deep, are proposed, for oxide and lime, in the proportion of six to four. There are to be seven holders, 176 feet in diameter, 70 feet high. We observe the holders are so close that in one instance a column is proposed to do duty for two holders. The cost is estimated at £712,000.

"*Excelsior.*"—(W. A. and H. Rigby, Bilston.)

This design is in three sections, and shows six retorts-houses, 70 feet wide, parallel with the Bradford Road, unequal in length, and the ends not being in the same line. There are eight retorts to each oven, and the total make is given at 20 millions. The coal is introduced by curves, and the coke is proposed to be removed by an arrangement of trucks, which we think would be rather complicated in practice. Seven gasholders are proposed with three lifts, rising 100 feet, four being 200 feet in diameter, and three 180. The cost is estimated at £758,000.

"*In Hoc Signo.*"—(John Burden, Edinburgh.)

This is designed in four sections. The make is given at 20 millions, and storeage is provided for 16 millions. The plan proposed for the retorts-houses is unique, and consists of a building in five spans, the three central ones having benches of 26, 23, and 26 ovens respectively, drawing to one shaft; the outer spans on each side form the coal stores, each of which is to be supplied direct from the railway siding, and it is proposed that these two coal stores be connected at the upper end. Seven retorts are proposed in each oven. The total cost is estimated at £512,000.

"*Constanza.*"—(H. Faija, Westminster.)

This design is arranged in three divisions, each to produce 6,700,000 feet, or a total daily make of 20,100,000. Three contiguous retort-houses are proposed to be built at the south end of the ground, which together would form one block of building 720 feet long by 156 feet wide. Each of these three retort-houses is proposed to have twice thirty-eight ovens with seven retorts in each. They are shown to be worked from a stage. Rails are planned at a high level for the supply of coal, and at a low level for the removal of coke. The scrubbers and condensers are placed at the south end of the retort-houses. The purifiers are placed on the eastern side near the Medlock, in three divisions, each having three sets of four, 31 feet square. Seven gasholders are proposed north of the retort-houses, four 230 feet in diameter, and three 180 feet in diameter with 40-feet lifts, having a total capacity of 20,600,000 feet, or half a million in excess of the make. The cost of the whole is estimated at £1,620,000.

"$SH + SO_2$."—(Wm. Burns, Little Ilford, London.)

This design is exceptional. The author states, in the general description which accompanies it, that he proposes an entirely different system, in manufacturing and purifying gas, to any now in use. The retort-houses are to be fitted with a system of piston retorts, by means of which it is stated 20 per cent. more gas can be obtained than by the ordinary method; and it is proposed that they be charged by hydraulic machinery. This is the only design where we observed mechanical stoking was distinctly proposed, although in many others it was stated it had been considered as a possible contingency. Multitubular condensers are proposed. The purification is to be by means of sulphurous acid, the details of which process are set forth in the general description with great minuteness and perspicuity. Four retort-houses are shown parallel to each other, each to have 100 ovens with nine retorts. We understand this to mean 900 mouthpieces. The make per day for each section is 5,130,000 feet, which would give 5700 feet per mouthpiece. This is but little in excess of the amount stated in some of the other designs, which do not introduce any special arrangement for working the retorts as is here proposed. Two purifying-houses are shown north of the four retort-houses, small in proportion when compared with some of the other designs. One meter-house is shown north of them. Four gasholders, 240 feet in diameter, 120 feet high, in two lifts, complete the arrangements. One peculiarity of the design is that it is proposed to be contained within the limit of the site first suggested by the Gas Committee. It has been prepared in a very elaborate manner. The cost is stated at £368,000.

"*Totaque Vagatur Urbe.*"—(Peter L. Henderson, Edinburgh.)

This design is very well got up, but trees are very strangely introduced where it would be impossible for them to grow. It is arranged in three sections. The entrance is not, as in the majority of the designs, near the cemetery gates, but near the railway bridge. The retort-houses of section No. 1 are four in number, and are placed at right angles to the railway siding, with an inlet direct for the coal by means of curves, and not by turntables. These houses are 60 feet wide, having between them coal stores 40 feet wide, and on the outside one of 28 feet, making a total width of 416 feet. The carbonizing plant will consist of four benches, each having 168 retorts, 16 inches diameter 20 feet long, in settings of fourteen or seven, through and through. Each 10 feet being charged with 3 cwt. of cannel, the make, at 9500 cubic feet per ton, amounts to 5,745,600 feet in 24 hours. There is no coke cellar shown. Hoists are provided for raising coke to the railway, and a platform is carried at the railway level along each side of the oxide stores.

Section No. 2 is a continuation longitudinally, similar in every respect to section No. 1; but section No. 3 is a further continuation of three houses only, two having a greater length. South of the retort-houses is the condensing plant, composed of three sets of air condensers, each to consist of six rectangular chests, 23 feet long, 5 feet broad, and 3 feet deep, and on each 22 annular pipes, 30 feet high, 4 feet 6 inches outer and 3 feet inner diameter, the latter being an air-column. The cooling surface provided is 17,100 feet. There is also a stokers room. South of the above are placed the boilers, engine-houses, and exhausters, and beyond them the washers, three sets to each section. Further south is placed a revivifying-shed, and beyond that the purifying-houses, 109 feet by 45 feet. The purifying plant is in three sets of four, with four trays to each, giving a total area of 6536 square yards. Hydraulic apparatus is proposed for lifting the covers. Two stores for oxide are provided, each of 647 square yards, over the revivifying-shed. The written description is very full with reference to the several matters provided by this design, giving the capacity of each in minute details. Gasholders are provided for three-fourths of the product, four having a diameter of 232 feet, holding nearly 2,800,000, and a fifth holding nearly two millions. Forty-eight-inch mains are proposed from these works. The approximate estimate is £580,000.

Correspondence.

THE GASLIGHT AND COKE COMPANY.

SIR,—The intimation that The Gaslight and Coke Company intend reducing the price of gas to 3s. 6d. next year is a very significant and important announcement, on which you are to be congratulated of having had *la primeur*.

It inaugurates a policy, showing that the company intend being the first in the field to reap the full value of the sliding scale in the matter of increased dividends. You will perhaps pardon my noticing that your statement brings with it an agreeable confirmation to me of figures and estimates, prepared by myself in my report for the Gas Committee of the Corporation of London, *re* Metropolis Gas, last year, relative to the cost of 16-candle gas, which I estimated should be charged at 3s. 6·66d. to yield the company *then* a full statutory dividend.

Whilst, in other respects, this is not *now* the full measure of what might be done, still every credit attaches to the company for striking out a policy which will benefit alike consumers and shareholders, whilst still working within a safe margin. I trust that "purchase" will not, however, be lost sight of. The increased and sustained value of the Chartered stock illustrates what the sliding scale is likely to do for that company in the future, and the restriction which Lord Camperdown proposed last session to impose on the company's stock was only well timed, and I have no hesitation in saying that, even previous to making them public, his lordship's judicious proposal had my heartiest commendation and concurrence.

The next parliamentary session will, I imagine, witness another large undertaking, at least, passing into the hands of the local authorities—Blackburn. Thanks to the persevering and praiseworthy efforts of Mr. Beads, of Eanam Mills, the Town Council have determined, with the unanimous sanction of the ratepayers, on pushing forward this important measure in the form of an Improvement Bill, to be submitted to Parliament next session.

ARTHUR SILVERTHORNE.

1, *Westminster Chambers, Victoria Street, S.W.*,
London, Oct. 13, 1876.

BACK DIVIDENDS *VERSUS* RESERVE-FUND.

SIR,—In your JOURNAL of the 26th ult., there is a letter from a correspondent, respecting back dividends, in which he says:

I will presume that most companies who are in a position to pay back dividends, are under the provisions of the Gas-Works Clauses Act, 1847; and, if I correctly, read that Act, it is *imperative* on such companies to pay *all back dividends* before they have the *power* to make *a reserve-fund*, unless they have exceptional provisions in their special Act.

I annex copy of such portions of the 31st clause of that Act as bear upon the question, to support my position; and, believing this to be a very important subject for many companies, I shall be pleased to have the opinion of my *confrères* on the point raised.

"*Gas-Works Clauses Act*, 1847, *Clause* 31.

"If the clear profits of the undertaking in any year amount to a larger sum than is sufficient, after making up the deficiency of any previous year as aforesaid, to make a dividend at the prescribed rate, the excess beyond the sum necessary for such purpose shall from time to time be invested in Government or other securities; . . . which sum shall form a reserved fund to answer any deficiency which may at any time happen in the amount of divisible profits, or to meet any extraordinary claim or demand which may at any time arise against the undertakers."

And in your JOURNALS of the 3rd and the 10th inst. there are two other letters on the same subject, but as these do not involve any fresh point, it will not be necessary to make further reference to them here.

In the first place, it may be as well to explain that a back dividend is the difference between the dividend actually paid and the maximum dividend prescribed by statute, and when this difference is made up, at any subsequent period, it is and can only be made up out of the "excess of profits" beyond the amount required to pay the maximum dividend.

When a company are not subject to any statutory regulations, they can charge any price they think necessary, and pay any rate of dividend they can earn; the term "maximum dividend" cannot, therefore, apply to such a company, and as the proprietors in such a company are entitled absolutely to the whole of the profits made in their time, the company cannot, under any circumstances, ever have any "excess of profits." Unless a company are under the Gas-Works Clauses Act, or have similar provisions in their special Act, none of these regulations can affect them.

The Gas-Works Clauses Act provides that a company shall not pay a larger dividend than 10 per cent. on their current transactions, but if a company are unable at one time to earn that rate of dividend, they may make it up at another time when in more prosperous circumstances, and then make a reserve-fund equal to one-tenth part of their nominal capital, and, as a protection to the public, it further provides that when the reserve-fund is made up, and the prescribed dividends have been paid, any further excess shall be applied to a reduction in the price.

Your correspondent seems to regard these provisions as obligations imposed upon a company to be carried out literally and in their entirety, whereas they are merely—and are only intended to be—a definition of what a company may do—their maximum powers, as it were—with respect to the profits. Beyond these they cannot go, but they may without doubt keep as much within them as they please. There is no law to make it imperative upon a company to exact on all occasions their "pound of flesh;" they may always give up the bond if they think it wiser to do so.

Your correspondent is in error in assuming that it is imperative upon a company to pay all back dividends before making a reserve-fund. If this rigid reading of the clause were to be acted upon, it might with equal propriety be said that the back dividends ought to be paid before even the current dividend.

If a company have the means, within these regulations, of paying their back dividends, they have a clear indisputable right to do so; but there can be no pretence whatever for saying that it is, under any circumstances, imperative on a company to pay them.

So long as a company do not appropriate any larger share of the profits than those provisions allow, they can use their own discretion as to their distribution. For instance, if the clear profits of the company in any one year are sufficient to pay the prescribed rate of dividend—that is, 10 per cent.—the company may appropriate the whole of those profits; but they are not obliged to distribute the whole as dividend. They may, with the concurrence of a general meeting, either appropriate the whole to dividend, or appropriate part to dividend and the remainder to a reserve-fund. So also, if the clear profits of a company are sufficient to pay the 10 per cent. and make up the whole or part of the back dividends, the company may appropriate the whole of those profits; but they are not obliged to distribute them in that way. They may, as in the other case, either distribute them in that way, or apply part to dividend and part to a reserve-fund, passing over the back dividends altogether.

The utmost that could be alleged against a company for making a reserve-fund before paying off the back dividends would be, that in so doing they had waived their right to pay back dividends from that time, inasmuch as clause 35, which provides for the reduction of price, says that when the reserve-fund is fully made up, and the dividends to the amount thereinbefore limited have been paid, the company shall make a rateable reduction, &c., &c, and this might be held to mean simply the 10 per cent., as there is no kind of reference in this clause to former deficiencies.

There cannot be a doubt but that a company have power to make a reserve-fund at any time they think fit to do so, and that they can do this either out of the ordinary 10 per cent. profits, or out of the excess of profits beyond the 10 per cent. The object of the clause seems to be entirely misunderstood; it is not for the purpose of enabling a company to make a reserve-fund—no parliamentary powers are required for that purpose—but to enable a company to appropriate the profits in excess of the 10 per cent. to the formation of the fund.

W. LIVESEY.

Gas and Water Companies Association,
6, *Victoria Street, Westminster, Oct.* 14, 1876.

Parliamentary Intelligence.

HOUSE OF COMMONS COMMITTEE.

TUESDAY, MAY 16.

(*Before Mr.* ELLICE, *Chairman; Mr.* W. H. GLADSTONE, *the Marquis of* HAMILTON, *and Mr.* WROUGHTON.)

WAKEFIELD WATER BILL.

(*Continued from page* 489.)

Mr. *T. Hawksley*, C.E., examined by Mr. VENABLES.

I have constructed about 100 water-works of different kinds. Amongst these are many very large ones in Yorkshire. I have often been consulted about the works at Wakefield. I was not, in the first instance, consulted about them; but I was called in to advise the company respecting the scheme of my friend Mr. Filliter—the scheme now before the committee—of which he is the engineer. I am acquainted with all this part of the country, having made various water-works in the neighbourhood—the water-works at Barnsley, for instance. I have visited the site, for the purpose of considering this scheme. I have made a very large number of sinkings in various parts of the kingdom for obtaining water; and a good many of them in the coal measures or the measures immediately over them. I know the formation of the district from which the water here is to be obtained. I have satisfied myself that there will be an ample quantity of water found there, not merely for the supply of Wakefield, which is, I suppose, to have a preferential supply, but also for the supply of the other places mentioned in the bill. But I may add, that which I know from experience is a very great advantage, if the company could not get all the water they want for an increase of the consumption at some future day, they have the power by this bill, and by the Water-Works Clauses Act, to purchase land, not exceeding in the whole 20 acres, and they can, under the 12th section of the Water-Works Clauses Act, sink any shafts on the line of their pipe that may be required for getting further quantities of water when and as they are required. I have had the opportunity, as an engineer, of performing operations of that kind, by buying land voluntarily upon the coal measures, and making sinkings thereon. In this case there is the same formation for miles. I consider that the results, in the production of water, of the sinkings in the neighbourhood, supply sufficient information for me to be able to judge of the quantity that may be obtained. At Wath-upon-Dearne, where they have made a recent sinking, I made my own examination and inquiries. I found that they had raised water at the rate of 10 strokes per minute, and six feet each stroke, with four pumps, two of them 18 inches in diameter, and two over 19 inches in diameter, and had raised more than 2800 gallons per minute, which works out to upwards of 4 million gallons a day. I know the position of the pumping station on the Wath Main, and I know that large quantities of water have been raised from other shafts during the process of sinking. Of course, after the shaft has got down to a water-tight stratum, the water is shut back by tubbing, and then it becomes available for water-works purposes. The object in mining is to exclude water; the object in sinking for water-works purposes is to allow the water to run into a hole which is artificially made for the purpose. Boring at this spot would do nothing whatever beyond showing (about which there can be no actual doubt) that the geological stratification is practically the same in one place as it is in another. As to showing the quantity of water, it would do nothing. I have considered the effects of a possible subsidence from the workings of the minerals in the neighbourhood, and I do not think that would have any result in diminishing the water. If, in the neighbourhood, a tubbed shaft became breached, the water for a time would escape into the shaft and drown the pit, but it would again come to the same level. There might be a temporary inconvenience if such an event should happen, but mine owners take care to keep the coal in for a certain distance round the shaft, so as to sustain it, independently of the adjacent ground. There is nothing in the geological section which raises any doubt in my mind as to the supply of the water. I know exactly what the quality of the water is, and I am of opinion that it is infinitely better than the water which Wakefield is now obtaining, and better, I think, than any which Wakefield is likely to obtain. The difficulties of obtaining water in the neighbourhood of Wakefield are enormous. I certainly think that it will be for the interests of the inhabitants of Wakefield to secure this scheme while it is offered to them. They can take no harm by it, because all the risk is incurred by private adventurers. I have looked at the analyses which several chemists have made of this water. It has been suggested, as an objection, that there is a certain quantity of chlorine in the form of common salt. That is the most innocent thing in the world in itself—perfectly harmless; but beyond that, the quantity here is very insignificant, and much less than is obtained in the case of many other water-works. I am opinion that this is a very good water under the circumstances. I do not deny that, were it practicable (which I know it not to be in any reasonable sense) to get a better, softer, mountain water, then this water might be said to be of comparatively inferior quality; but the difficulties of getting a supply of water of that description for Wakefield are so enormous that I look on it as perfectly hopeless, and think Wakefield will be a great gainer by getting this supply instead of its present supply. The Wakefield Water Company have spent nearly £40,000—between £30,000 and £40,000—in endeavours to get a supply of water from the hills, and they have failed. Many towns, and some very large towns, have to content themselves with a harder water; and allow me to tell you one thing with regard to hard and soft water, as regards health. It is perfectly well known, and now generally admitted, that the towns into which hard water is supplied have uniformly a smaller proportion of deaths than those into which soft water is supplied; the difference is about four in a thousand on the average.

For domestic purposes only I would prefer moderately hard water; you may have it objectionably hard. I should have no object in getting it peculiarly soft. It is more a question of soap than anything else. I am aware that there have been some complaints about an insufficient pressure in one of the highest districts of Wakefield; but according to the present scheme that evil will be entirely removed. The Chevet reservoir is at a very considerable height; it commands the whole place. They will have abundant pressure—rather too much, perhaps, than too little. The result is that, on the whole, I think this is a very good scheme. It is almost the only one, in point of fact, which it is open to the company to have recourse to.

Cross-examined by Sir E. BECKETT: I say that hard water is healthier than soft, because the returns of the Registrar-General, which have been very carefully analyzed, point to that result.

Sir E. BECKETT: Here is the report of the Rivers Pollution Commission for 1874, in which they say expressly: "In towns where the chief sanitary conditions prevail with tolerable uniformity, the rate of mortality is uninfluenced by the softness or hardness of the water supply to the inhabitants." That is the latest theory on the subject, is it not?

Witness: The Rivers Pollution Commissioners are practically only Dr. Frankland. That is an individual opinion, I am bound to say, and it is truly said so.

Sir E. BECKETT: You do not think much of his opinion?

Witness: I do not think much of his crochets. He is a most excellent experimental chemist, but he is about the worst at deducing conclusions that I ever met with in my life. He sets up an idol of his own creation, and calls upon everybody else to worship it; and there is no fact in his particular doctrine.

Sir E. BECKETT: Was not the whole scope of your evidence in 1874 to prove that soft water was better for Wakefield than hard?

Witness: My evidence was to this effect, that the manufactures of Wakefield would be aided by the introduction of such soft water as is procurable from the Don or other elevated districts of Yorkshire. For textile manufactures, and for scouring wool, soft water is preferable.

The CHAIRMAN: Do you consider that the results that have been ascertained at the Darfield Main on the one side, and the Wath Main and the Manvers on the other, as to the quantity of the water, are a sufficient and satisfactory test of the water to be found in the proposed new pumping-station?

Witness: In this sense it is quite satisfactory as to any quantity the water company want for a great many years to come, but when there is any continuous pumping, I have found, as a fact, that the water generally takes off, as it is called, to about two-thirds of what it was in the first instance, and that two-thirds becomes the permanent quantity.

The CHAIRMAN: That is not my question. What I wanted to ask you was, whether the water found by experience at these several points is a satisfactory test of the quantity of water to be found at the new pumping-station?

Witness: Yes. I know no reason to the contrary.

Mr. VENABLES stated that that was the case for the promoters of the bill.

WEDNESDAY, MAY 17.

The case for the petitioners was opened this morning by calling witnesses, the learned counsel who appeared for the corporation reserving his speech till the close of the evidence.

Professor *John Attfield*, examined by Mr. MICHAEL.

I am a Professor of Practical Chemistry to the Pharmaceutical Society of Great Britain. I have had great experience for many years in the analysis of water and other matters. I have made several analyses of water from the Wath Main shaft. The following tables were handed in:—

Professor Attfield's Analysis of Water, marked "I. S., September."

	Grains per Gallon.
Potassium	0·49
Sodium	7·70
Calcium	(?)1·96
Magnesium	1·12
Oxides of iron and aluminium	0·07
Radical of silicates ($Si O_3$)	1·61
Radical of sulphates (SO_4)	6·16
Chlorine	6·30
Phosphates	A trace.
Nitrites	None.
Radical of nitrates (NO_3)	0·19
Radical of carbonates (CO_3 by difference)	5·62
	31·22
Nitrogenous organic matter (about)	00·07
Total solids	31·29

The metal and other radicals, &c., mentioned in the foregoing table are in the water chemically combined as follows:—

	Grains per Gallon.
Nitrate of potassium	0·31
Carbonate of potassium	0·65
„ sodium	6·10
Silicate of sodium	2·58
Chloride of sodium	10·38
Carbonate of calcium	3·15
Sulphate of calcium	2·38
„ magnesium	5·60
Oxides of iron and aluminium	0·07
Total mineral matter in solution	31·22
„ organic „ „	00·07
Total solid matter in solution	31·29
Moisture combined with solids	2·71
	34·00

Organic Matter.	Decimal Parts of Grains per Gallon.
Ammonia from ammoniacal matter	0·004
„ albumenoid organic matter	0·003

This ammonia is equivalent to about 0·07 of a grain of nitrogenous organic matter per gallon.

Professor Attfield's Analysis of Water, marked "W. D."

	Grains per Gallon.
Potassium	0·280
Sodium	6·252
Calcium	3·710
Magnesium	1·153
Iron	1·176
Alumina	0·354
Silica ($Si O_2$)	0·830
Radical of sulphates (SO_4)	6·076
Chlorine (in combination)	6·300
Phosphates	A trace.
Nitrites	None.
Nitrates	A trace.
Radical of carbonates (CO_3 by difference)	9·069
Nitrogenous organic matter (about)	0·170
Total solids	35·370

The metal and other substances mentioned in the foregoing table are in the water chemically combined as follows:—

	Grains per Gallon.
Carbonate of potassium	0·490
„ sodium	5·006
Chloride of sodium	10·380
Carbonate of calcium	6·000
Sulphate of calcium	4·450
Carbonate of magnesium	1·200
Sulphate of magnesium	4·050
Carbonate (?) of iron	2·440
Alumina	0·354
Silica	0·830
Total mineral matter in solution	33·1
„ „ „ suspension	2·1
	35·20
Total organic matter in solution	0·07
„ „ „ suspension	0·10
	00·17
Total solid matter in unfiltered water	35·37

(Total solid matter in water when filtered, 33·17.)

Organic Substances.	Decimal Parts of Grains per Gallon.
Ammonia from ammoniacal salts	0·002
„ „ organic matter in solution	0·005
„ „ organic matter in suspension, only removable from the water by very thorough filtration	0·010

This ammonia probably corresponds to, or results from, organic matter in solution—0·07 of a grain per gallon—and from organic matter in suspension, 0·10 of a grain per gallon.

Gaseous Substances.	Cubic Inches per Gallon.
Carbonic acid gas	13
Oxygen gas	1
Nitrogen gas	4
	18

Professor Attfield's Analyses,

Showing variation in the quality of Wath Main Colliery shaft water. Samples collected March 27, 28, and 31 yielded the following results:—

	Grains and Decimal Parts of a Grain per Gallon. March 27.	March 28.	March 31.
Total solids, dried at 212° Fahr.	36·0	37·0	27·0
„ „ 230° „	34·0	35·0	26·0
„ „ 260° „	33·0	34·0	25·5
Ammonia from ammoniacal compounds	0·019	0·011	0·005
„ albumenoid organic matter	0·003	0·004	0·002
Nitrites	None.	None.	None.
Nitrates, containing 16 per cent. of nitrogen	0·2	0·2	0·25
Chlorides „ 60 „ chlorine	11·6	10·0	5·2
Total hardness (in chalk grains "or degrees")	10·0	9·5	13·0
Temporary hardness	7·0	6·5	10·3
Permanent „	3·0	3·0	3·0

Effect of Ebullition on the Sample of Wath Main Water collected on March 31.

Degrees of Hardness.	Degrees Unaffected by Ebullition.	Degrees Removed by Ebullition.	Total Degrees of Hardness.
Original water	—	—	13
Boiled one minute	13	—	13
„ gently, 15 minutes	9	4	13
„ fast, 15 minutes	6	7	13
„ one hour	3	10	13

Professor Attfield's Analysis of Water

Taken from Wath Main Colliery shaft on April 9, 1876.

Saline matter, 15·34 grains.

	Grains per Gallon.
Potassium—a little	5·91
Sodium—chiefly	
Radical of sulphates (SO_4)	3·27
„ chlorides (chlorine)	3·10
„ nitrates (NO_3)	0·15
„ carbonates (CO_3)	2·91
Earthy matter, 11·2 grains.	9·48
Radicals of carbonate (CO_3)	6·76
Calcium	2·59
Magnesium	1·17
Silica—chiefly	0·70
Alumina—a little	
Oxide of iron—a little	
Anhydrous mineral matter	26·54
Organic and other nitrogenous matter yielding 10 per cent. of ammonia	0·17
Total solids in solution in Wath Main water	26·71

Saline compounds, 15·34 grains.

	Grains per Gallon.
Nitrate of potassium	0·25
Sulphate of potassium—some	4·48
„ sodium—chiefly	
Chloride of sodium	5·11
Carbonate of sodium	5·14
Earthy compounds, 11·2 grains.	
Carbonate of calcium	6·48
„ magnesium	4·02
Silica—chiefly	0·70
Alumina—a little	
Oxide of iron—a little	
Total anhydrous mineral matter	26·54
„ organic and other nitrogenous matter yielding 10 per cent. of ammonia	0·17
Total solids in solution in Wath Main water	26·71
Moisture remaining with the solid matter when the latter is dried at 212° Fahr.	1·29
	28·00

Nitrogenous Matter.	Decimal Parts of a Gallon.
Ammonia from ammoniacal matter	0·015
„ albumenoid organic matter	0·002

I am not aware that the sample of water marked "I. S., September," was water furnished by the company to the corporation. I received and analyzed it on March 10. The sample marked "W. D." I also received on March 7, and analyzed it immediately afterwards. I received them all from the town-clerk of Wakefield with the exception of the last, which I took myself. The general result of the analyses is, that water obtained in Wath Main at one time cannot be depended upon as a sample of the water taken at other times, though taken from the same shaft. The samples vary in hardness from 25 to 30 per cent. They vary in the amount of the substances termed sulphates 200 per cent. They vary in the amount of chlorine 100 per cent. They vary in the amount of total solids from 25 to 30 per cent. The cause of that variation is the presence in the water of what has been termed "bind." I produce a specimen of the bind, which we have heard termed "rock bind." Its position is pretty much that of slate. Chemically speaking, it is a silicate of alumina, the same material that forms clay and slate. It contains, in addition, some carbonate of lime, some carbonate of magnesia, some sulphate of lime, and some iron. It is impervious to water. It separates the portions of sandstone from each other. The sample I hold in my hand is a sample of the sandstone which I brought from the Wath Main pit. The sandstone of this bind and various shales go to form what is collectively termed the Oaks rock. The piece of sandstone has on its surface a little micaceous substance. If the committee will allow me, I will show them that water which will readily pass into sandstone will not pass into the rocky "bind." It is sufficient to add one drop of water to the sandstone, and in the course of a minute or two it will be found to sink into that substance, but if a small drop of water is placed upon a piece of the bind, there it remains, and does not sink in at all. [The witness illustrated his remarks.] The bind chemically affects the quality of the water. Water dissolves from this bind magnesia in the form of carbonate. It also entirely separates the different qualities of water from each other, so that if one obtains constant differences of quality when analyzing waters obtained near to each other, that is evidence that there is some impervious material separating the water-bearing strata from each other, so that one need not actually detect with one's eyes the presence of bind, or slate, or clay, or anything of that kind. It is quite sufficient to obtain a sample of water by pumping, and analyze that sample of water. If the samples of water thus obtained from day to day vary constantly from each other, that is evidence that there is a floor or wall of some such impervious material separating these waters from each other.

Mr. MICHAEL: Have you come to the conclusion that there are two separate waters to be found in this shaft?

Witness: Every analysis that I have made, or which I have heard reported in this room, shows that there are at least two entirely different qualities of water obtained from that one spot—the Wath Main shaft.

Mr. MICHAEL: Does that depend upon the bind intervening in your opinion between the two, or how do you account for the two differences being found in the same reservoir of rock?

Witness: I account for the two different qualities of water being obtained in the same reservoir of rock by the presence of this wall or floor of bind which separates the qualities of water from each other. The source of the substances in either of the two specimens of water is the earth or rock through which the rain has passed in getting to the place from which the samples are drawn. In its passage to that place the rain may dissolve, from the soil or from the rock through which it passes, any one of very many substances.

Mr. MICHAEL: If it cannot pass through this bind, how do you account for the water being of very much greater hardness, and containing these materials in the one case and not in the other?

Witness: The water which has got to one side of the bind has simply dissolved more hardening materials than the water which has reached the other side of the bind.

Mr. MICHAEL: Does it dissolve any of the materials out of the bind itself?

Witness: It gets those materials from the bind to some extent. That I know, because I have analyzed the bind as I have already stated, and because I find the same substances in the water that I find in the bind. But, in addition, the two different qualities of water contain substances which are not in the bind.

Mr. MICHAEL: How do you account for that?

Witness: Each quality of water has simply dissolved those substances from the points in the soil or rock where it may have found those substances.

Mr. MICHAEL: Is the solubility of those matters dependent to some extent upon the presence of free carbonic acid in the water?

Witness: Some of those substances would not dissolve in the water to any appreciable extent, unless carbonic acid were in the water. Other substances will dissolve in the water, whether carbonic acid is there or not. I can give evidence that in the area of a mile, or less, you may have in the water, at one part of the rock, substances which are sometimes dangerous to health, which you have not at another part. In the summer of 1864, the year when the meeting of the British Association was held in Bath, I was permitted to walk through the Box tunnel, which is a tunnel nearly two miles long, a little on the London side of Bath. As I walked through that tunnel, I carefully noticed the rock through which the tunnel passes—which is called the Bathstone rock—with the view of ascertaining to what extent the water, which fell on that rock in a state of rain, was influenced by its passage through the rock, I found at one part water coming through the rock, and through the narrow fissures of the rock, which, so far as taste could indicate, appeared to be of good general physical quality; but some of the water passing through that rock tasted of iron. It had quite an inky flavour, and at one place the water which came through the Bathstone rock into the Box tunnel smelt very strongly indeed of sewage. There was an unmistakeable smell of sewage. That water was coming through fissures in the rock. Last year I had an opportunity of seeing large faces of slate rock in the Delabole quarries. The Delabole quarries are near Tintagel, in the land of Arthur, in Cornwall. They are very large. They are several hundred feet across in each of two directions, and in the vertical walls of slated rock they are exposed. One could see currents of water flowing down, escaping through fissures in the slate, which water appeared to the eye to be good, and was of good flavour. At other places water was escaping from fissures not 100 yards from where water was flowing, where the water appeared, as Mr. Hawksley described it, like blood, and tasted like ink. That water was clearly ferruginous. At other parts bright water was trickling down, enabling ferns to grow in rich abundance. Two years ago I had an opportunity of walking through a huge fissure in a rock, that fissure being wide enough to enable one to walk through. It is more properly described as a gorge. This gorge was near a place in Switzerland called Vernayoz. It was a gorge varying in width from 8 feet to about 30 feet. It was about 400 feet deep, and half a mile long; and as one walked through that gorge through that distance of half a mile, one could see various qualities of water trickling from the rock on the other side, sometimes clear and bright, and if one caught a little in the hand it tasted good; but at other times looking dark coloured and tasting of peat, and at other times like chalybeate. I may say that I have also myself seen fissures in rocks of various kinds upon visiting many caverns such as those at Cheddar, Torquay, and in Derbyshire.

Mr. MICHAEL: Do you think the water in those rocks comes through fissures in order to get into the substance of the rock itself?

Witness: I have not myself been down the Wath Main shaft, therefore I cannot speak directly on that point; but I have heard from previous witnesses that water does pass through this sandstone portion of the Oaks rock, through the rock itself—I mean filters through the rock—and I have also heard from those witnesses that it passes through fissures also. If surface water containing sewage passes into such a rock as this Oaks rock, that sewage will, if the water actually filters through any considerable quantity of the rock, be removed from solution in that water to a very large extent; but if surface water passes into the Oaks rock by means of the fissures, the sewage will not be taken out of such water. It would pass, in fact, through the fissures without being oxidized, and so pass through the rock comparatively in its original condition where the ochrous matter might get in, as you find it does in coal measures. It might get into the Oaks rock by means of fissures. At one place you may have much more magnesia in this Oaks rock water than in another, on account of the presence of more bind. You also might have more hardness in one portion of the Oaks rock water than at another, as, indeed, you do have a mile and a quarter away from Wath Main. There you do have a greater amount of hardness in the Oaks rock water, and you also have substances at that point—a mile and a quarter away from Wath Main—which are not present in the Wath Main water; and, on the other hand, in that water, a mile and a quarter away from Wath Main, substances are absent which are present in the Wath Main water. I have heard the evidence with respect to the Manvers pits, which are a quarter of a mile distant from one another, and that the quantity of water in one was in the relation of six to one in the other. The deduction to be drawn, in my opinion, from such a difference existing within a quarter of a mile is, that there is some such material as this earthy bind or similar clay between those two shafts. I have also heard one witness state the water in one of the two contiguous shafts may be quite unaffected by the pumps in the other shafts. That I can quite understand, now that I know that this rocky bind is met with in the Oaks rock.

Mr. MICHAEL: Would that be the effect even if this earthy bind were such as I see you have got a specimen of? There are parallel plains in the rock itself?

Witness: If the rocky bind occurs in the lateral strata, it will separate the water above it from the water below it.

Mr. MICHAEL: How thick, in your opinion, must the rock be where the bind is, in order to effect this separation of which you speak?

Witness: That will depend a little on the quality of the bind. If the bind is almost as solid as slate, then a very thin layer indeed will quite suffice to separate the two different qualities of water from each other. I will assume, at the outside, that half an inch would be ample to separate the two different qualities of water from each other. The bind which occurs in this rock must be yards thick before it effects any separation. Half an inch is as much an effectual stoppage to the water as 20 feet. I have placed water on that piece of bind and kept it there [referring to the sample produced].

Mr. MICHAEL: Then we may take it as proved in evidence by the promoters, that there are great differences in quantity; and you, by your analysis, have proved that there are great differences in quality of water occurring within a short distance?

Witness: That is so. At the New Manvers pits, which are only a quarter of a mile from where they propose to put their works, there is an immense difference in the quantity of water. My analyses have shown that there is great variability in the quality of water. I infer from the variation in quantity and quality, with respect to that distance, that you have not the slightest guarantee that the water which you may obtain at the proposed pumping-station is likely to resemble that at Wath Main, either in respect of quantity or quality. Assuming the Wath Main water to be a sample of the proposed supply, then I have to say first, as regards potability, that this Wath Main water contains amost unusually large quantity of magnesia. I am not a medical man, and therefore I cannot precisely state the significance of this fact as regards potability.

By the COMMITTEE: I have found quantities of carbonate of magnesia, varying from about 4 to 5½ grains. I am speaking of grains in the gallon, there being 70,000 grains in a gallon.

By Mr. MICHAEL: Respecting this magnesia, I would state that, as I am aware some medical men think magnesia to be harmful in water, I therefore would consider the presence of an unusual quantity of magnesia to indicate a bad quality of water. The magnesia is contained in the form of carbonate, and it is possible that it exists in the form of a sulphate in the water. The quantity of sulphate of magnesia, commonly called Epsom salts, equivalent to four grains of carbonate of magnesia, would be 12 grains in a gallon. That is crystallized sulphate of magnesia. The proportion is, as near as can be, three to one. The amount of sulphate of magnesia in the Wath Main water would not be quite 12 grains, because in most of the samples there is not enough sulphuric acid, as it is called, to form with the magnesia 12 grains of sulphate; but there is enough of another acid to form a salt corresponding to sulphate of magnesia—namely, chloride of magnesium. I think it probable that it exists in the form of carbonate, but it is also probable that it occurs partly as carbonate and partly as sulphate. The quantity of soda in the water is unusual, as compared with water generally, but the quantity is not unusual in the deep well water. I cannot speak as to its medicinal effect; I can speak to the chemistry of it merely. If you have magnesia as carbonate, you will have some soda there as sulphate; but the magnesia is there as a sulphate, and you will have some more carbonate of soda. As to the fitness of the water for domestic use, I will say that it wastes soap, as it contains magnesian compounds and calcareous compounds. These compounds decompose soap and give a curd to the water, so that it is impossible to wash in such water. You must wash out of it. You must take up a little into your hand, soap your hands, and this, in chemical language, will decompose all these earthly salts in the water, or, in popular language, will kill the magnesia and the lime, and then you will get a lather. If you add enough soap to the whole quantity of water you are washing your hands in, or your body in if it is a bath, to decompose or kill all the lime and magnesia compounds, you then will waste such an amount of soap as, if you are using 100 gallons of water, is represented by about two pounds of soap wasted. I am comparing it with water that is quite pure as regards magnesia and calcareous matters. The amount of hardness in town water varies very considerably. I can compare this with London if you like. The average hardness of the Wath Main water is nearly that of London. The total hardness of Wath Main water, as in my analysis, varied from 10° to 13°. The hardness of London water varies from 14° to 15°. The permanent hardness of Wath Main water I have paid considerable attention to. This so-called permanent hardness varies according to the mode in which you ascertain it. Permanent hardness in water is supposed to mean the amount of hardness which remains after you have boiled the water; but the amount of the hardness remaining after the water has been boiled depends upon how long you boil it, and how fast you boil it. If the sample of this Wath Main water, which has 13° of hardness, is boiled for one minute, its hardness is not sensibly affected. If it be boiled gently for fifteen minutes, 4° of hardness out of the 13° will be removed. If boiled fast for fifteen minutes, 7° will be removed. If boiled for one hour, and at the end of that hour any water which may have escaped as steam be replaced by pure distilled water, 10° will have been removed. If you boil the water in such a way that all the steam which is evolved shall condense to water again and run back into the original bulk, and if you so treat this water of 13° of hardness, you will remove about half of its hardness. The hardness is got rid of by precipitation. The amount of material which produced the hardness is still in your vessel.

The CHAIRMAN: What would be the quantity of solid precipitate out of 100 parts boiled for an hour, or 70,000 parts—that is, one gallon?

Witness: In this sample of water that I am speaking of, drawn on the 31st of March, if you boil one gallon of it for one hour in the manner that I have described, namely, boiling it in an open vessel, and then making up with pure

water whatever amount of water may have been lost as steam, then from that gallon of water you will have ten grains of material deposited.

Mr. MICHAEL: That deposit must either fall to the bottom of the vessel, or spread itself over the surface of the vessel in which the boiling takes place?

Witness: It will fall to the actual bottom of the vessel, or it will be deposited on the side of that vessel. I have stated that this water is very nearly as hard as London water generally, and like London water it gives this deposit that we have been speaking of in vessels in which it is boiled, and water of such a degree of hardness practically prevents the water being heated in coils of pipe or in boilers which are commonly attached to baths and heated by gas, and prevents such water being used throughout the town unless you are prepared to renew your pipes or your boilers every few years. I mean boilers made with tubes, or boilers such as are commonly introduced in London for heating baths. They are boilers made of two plates of metal placed at a very short distance from each other. They thus present a greater surface to heat. I am speaking of water of practically the same degree of hardness as Wath Main water. The water of the Wath Main degree of hardness used in such a boiler as I have described fills up that boiler with magnesian and calcareous matters in a few years to such an extent that the boiler can no longer be used, because this calcareous and magnesian matter is deposited when the water is boiled, and I have in my hand a specimen of such a boiling [producing the same]. Such a boiler has its top and bottom very close together, and must be of that construction in order to render it efficient for the purpose I have alluded to. The amount of space is so small that in two or three years the deposit is sufficient to fill up that space, and oblige you either to give up that mode of heating your boiler, or to have a new boiler. I have a specimen of such a boiler in my hand, and it will be seen to contain this deposit. The water which produced that result is the New River water, heated in a copper boiler, and the result was produced in my own house. After four years I must renew that boiler at a cost of £3. There was a gas boiler attached to both.

Mr. MICHAEL: Looking at the constitution of this water, do you form the conclusion that a similar result would follow from the use of it in a similar boiler?

Witness: I do, and I will state why. I was anxious to present it in the condition in which it came from my house. The crust upon this piece of the boiler does not adhere very strongly; it falls off quite easily. It is magnesian and calcareous matter, to which I have previously alluded. There is not so much magnesia in the London water as in the water which is dealt with here. Not one-fourth as much. In this crust there is only a trace of magnesia. It is chiefly calcareous matter. I do not think the quantity of magnesia would materially affect the physical character of the crust. A portion of it would be deposited, and the other portion would remain in solution. With respect to the use of the Wath water for manufactures, I have formed an opinion as to its use for the various manufactories which exist in Wakefield. I am of opinion that this water is bad for dyeing purposes, and that it is a bad quality for wool-works. It is bad for dyers, because the calcareous and magnesian substance in the water form with the dye a curdy matter similar in its curdiness to the curd which you get when you wash with soap. It would affect the materials dyed, wasting the dye for one thing, because the lime and magnesia present unite with a portion of the dye and form an insoluble curdy substance. It is the same kind of thing that occurs when soap is used, which forms a curd in the water. It is the same kind of action; it is a coloured curd. It affects the goods that are dyed. It spots them. It is more especially evident when colours are very light; the coloured curds adhere to the fabrics. That action has been known many years. It is in modern as well as in old books. This water would affect the cleansing of the wool, as it tends to roughen the wool, because the magnesian and calcareous substances, which are deposited when the water is boiled, adhere to the wool just as they would adhere to the surface of the boiler. Further than that, when wool is washed in such water by the aid of soap, the curd produced is entangled in the wool. That tends to make the wool harsh. Wool can be washed with such water, but not so well as if the water did not contain these magnesian and calcareous substances. Most certainly it would involve a loss to the manufacturer who employed this water as against the softer water used in the district. The use of this water would affect the persons who employ steam, the substances that I have mentioned being deposited in the water. There would be a loss of heat from the incrustation of the boiler. Then there is more or less of danger according to the extent to which the substances deposited on the boiler assume the condition of, on the one hand, mud, or, on the other hand, stone, and according to the extent to which the boilers may be cleaned from time to time of this material.

(*To be continued.*)

Legal Intelligence.

WIGAN COUNTY COURT.—WEDNESDAY, OCT. 11.

(*Before Mr.* W. WYNNE FFOULKES, *Judge.*)

CHADWICK *v.* THE CORPORATION OF WIGAN.

Mr. LEES appeared for the plaintiff, and Mr. PEACE (town-clerk) for the defendants.

In this case Adam Chadwick, shopkeeper, of Whelley, Wigan, sued the Corporation of Wigan for £30, for damage sustained by him in consequence of an explosion of gas, caused, as alleged, through the negligence of the corporation.

Mr. LEES, in opening the plaintiff's case, said that on Friday evening, the 31st of March last, his client arrived home about half-past seven o'clock, when his wife informed him that a smell of gas had been perceived by a person who had been at the shop. Plaintiff could not smell it, and in order to satisfy himself, he took a candle and tried the pipes and brackets, but found no escape. He afterwards went to a cupboard in the shop, to get some butter. He lighted a match for the purpose, and immediately he opened the door an explosion occurred, blowing out the front shop window, and destroying the whole of the goods which were in the window, besides knocking plaintiff and his wife to the ground. Shortly after a collier, named Sherrington, came to the place with his Davy lamp, and examined the meter and the pipes, but found no leakage. Sherrington went to the cupboard, and found the meter in a perfect state. Subsequently the pavement outside plaintiff's house was removed, and the gas-pipe was found at a depth of 1 foot 11 inches. This pipe, which was broken, crossed a sewer-pipe belonging to the corporation, and it was alleged the accident had occurred through the negligence of that body. The law was pretty well settled that in a case of this kind the corporation were liable for any damage sustained, and he (Mr. Lees) hoped to be able to show something more than common negligence on their part. It was well known that the Corporation of Wigan purchased the gas-works in June, 1874, and he would be able to prove that since then the Gas Committee had had it brought to their knowledge that the whole of the mains in the borough were in so wretched a state that every year a vast quantity of gas was being lost. The sum claimed for the damage sustained by the plaintiff was £30, £25 10s. for the actual damage, and £4 10s. for the pain and inconvenience occasioned to the plaintiff by the accident; and that, he thought was a very moderate sum indeed. No doubt the defendants would allege there had been contributory negligence on the part of the plaintiff, but he hoped to be able to prove to the satisfaction of the jury that no contributory negligence had taken place.

Adam Chadwick said he was the plaintiff in the action. When he reached home on the evening of the explosion he perceived a curious smell, but he did not know whether it was gas or whether it proceeded from some other cause. When he went to the cupboard where the meter was kept he did not have a candle with him, and had no intention at the time of trying to find out where the gas was proceeding from.

In cross-examination he said he had seen it printed on the back of the gas bills that no person should use a light when he perceived a smell of gas.

Mrs. *Chadwick*, the plaintiff's wife, said she had her back to her husband when the explosion occurred, and could not, therefore, say whether he had a candle in his hand or not.

Edward Sherrington, collier, said he examined the meter and the gas-pipes shortly after the accident with his safety-lamp, and no escape of gas was indicated.

James Chadwick, plaintiff's son, also gave corroborative evidence.

Mr. *William Burgess Johnson*, civil engineer, Wigan, said he visited the scene of the accident on Monday, Oct. 9. The defendants men proceeded to excavate to the gas-mains, which were only 1 foot 11 inches from the surface. The ground was laid with sets 7 inches deep, and considering there was only 16 inches of earth from the top of the pipe to the bottom of the sets, he did not think that was sufficient to protect the pipe from the pressure above; and, besides, he did not consider the packing of a proper description. Underneath the gas-pipe was a 6-inch sewer-pipe, crossing it at a slight angle, and this prevented it being properly packed. The service-pipe passed from the main right under the floor of the plaintiff's house to the cupboard where the meter was kept; and his opinion was that, after the pipe in the street had been broken, the gas passed underneath the floor of the shop, and by means of a hole in the bottom of the cupboard, gained access to the chamber, which rapidly filled with gas. He did not break up the floor to ascertain for a certainty whether that had been so or not; but it was the only way in which he could account for the occurrence of the explosion. The main was very much corroded, and in some parts was not more than an eighth of an inch in thickness.

In cross-examination, witness said he had known pipes to be packed with concrete and brickwork. Cinder packing was the worst they could apply for that purpose; it was the most destructive. The ground was subsiding in the district.

In re-examination, witness said that if the ground had subsided in this instance, the sewer-pipe would have been broken as well as the gas-pipe, because it lay immediately below it.

Mr. *Hugh Williams*, civil engineer, Wigan, said he visited the place with Mr. Johnson, and found the pipe, which was repaired by means of a thimble, with a sewer-pipe crossing underneath. The soil was very loose, being composed of cinders and ashes, and the whole was being improperly packed. The cause of the fracture was the position of the sewer-pipe, the corrosion of the pipe and the nearness of the pipe to the surface. At Pemberton he, as engineer of the local board, forced the contractor to take special precautions in laying gas-pipes where they had to cross water-pipes; and he was decidedly of opinion that the cause of breakage was weight from above and not from the sinking of the ground owing to mining operations. No doubt subsidences did take place, and the corporation must have been acquainted with the fact.

William Kelly, gas-fitter, said he had inspected the place on the previous Monday with the last two witnesses, and his opinion was that the cause of the fracture was owing to the defective packing and the nearness of the pipe to the surface. He never knew pipes in a public road to be packed with concrete.

Mr. *William Holt*, borough treasurer, said he remembered an inquiry being held in July last at Wigan by Mr. J. Smith, one of the Local Government Board inspectors, at which Mr. Hawkins, manager and engineer of the gas-works, gave evidence. Mr. Hawkins then said many of the mains were corroded.

His HONOUR said Mr. Lees could not ask such questions from witness, but if he thought necessary he could put the questions to Mr. Hawkins himself.

This closed the case for the plaintiff.

Mr. PEACE stated the case for the defendants. He said that in 1874 the corporation became the purchasers of the undertaking of the gas company, and took over the works as they then stood. The question the jury had to try was whether the corporation were legally liable to compensate the plaintiff for the loss sustained by him in consequence of the explosion. The corporation were sorry for what had occurred, and would be ready to compensate the plaintiff if liable, but they considered that the proper parties to sue in this instance were the persons who were getting the coal underneath the street in which plaintiff's house was situated, and by whose operations a subsidence of the ground had taken place. Indeed, the street had subsided three feet during a few years. He would ask the jury, who lived in Wigan, and those who saw the consequences of sinking the mines, as common-sense men, to come to the conclusion that the fracture to the gas-pipe had been caused by the colliery proprietors, and that they alone were liable for any damage that might have been incurred. If they came to that conclusion, we would ask them to give a verdict for the defendants. It was perfectly clear that the people who got the coal had no right to break the pipe. Referring to the immediate facts of the case, he said it had by no means been proved to his satisfaction that the gas which exploded in the cupboard had come from the fractured pipe in the street. Supposing all the other points were against him, before the jury could find a verdict for the plaintiff they must be satisfied that the damage had been occasioned by the improper conduct of the defendants. As he had been instructed, the plaintiff went to the cupboard with a lighted candle, and it was then that the explosion took place. To prove his case he would call persons conversant with gas-works and the strength of pipes, and not civil engineers, whose duties were chiefly confined to the construction of railways and the drawing of plans.

Mr. *William Rogers*, mining engineer, said he had surveyed for the landlord the mines under the street in which plaintiff lived and the street adjoining. Altogether, seven mines had been worked, and about 20 feet of coal had been extracted. Owing to that, there had been a gradual subsidence of the ground, and nearly all the houses in plaintiff's street were cracked. The gas-pipes would be cracked by the subsidence.

In cross-examination, witness said if there was a sewer-pipe underneath the gas-pipe it would also crack, supposing there was a subsidence.

Mr. *William Bolton*, borough engineer, said he had taken levels of the street opposite plaintiff's dwelling from time to time, and from February, 1874, till the present time, the ground had sunk 3 feet 2 inches. In that neighbourhood many of the sewer-pipes had broken in consequence of the subsidence.

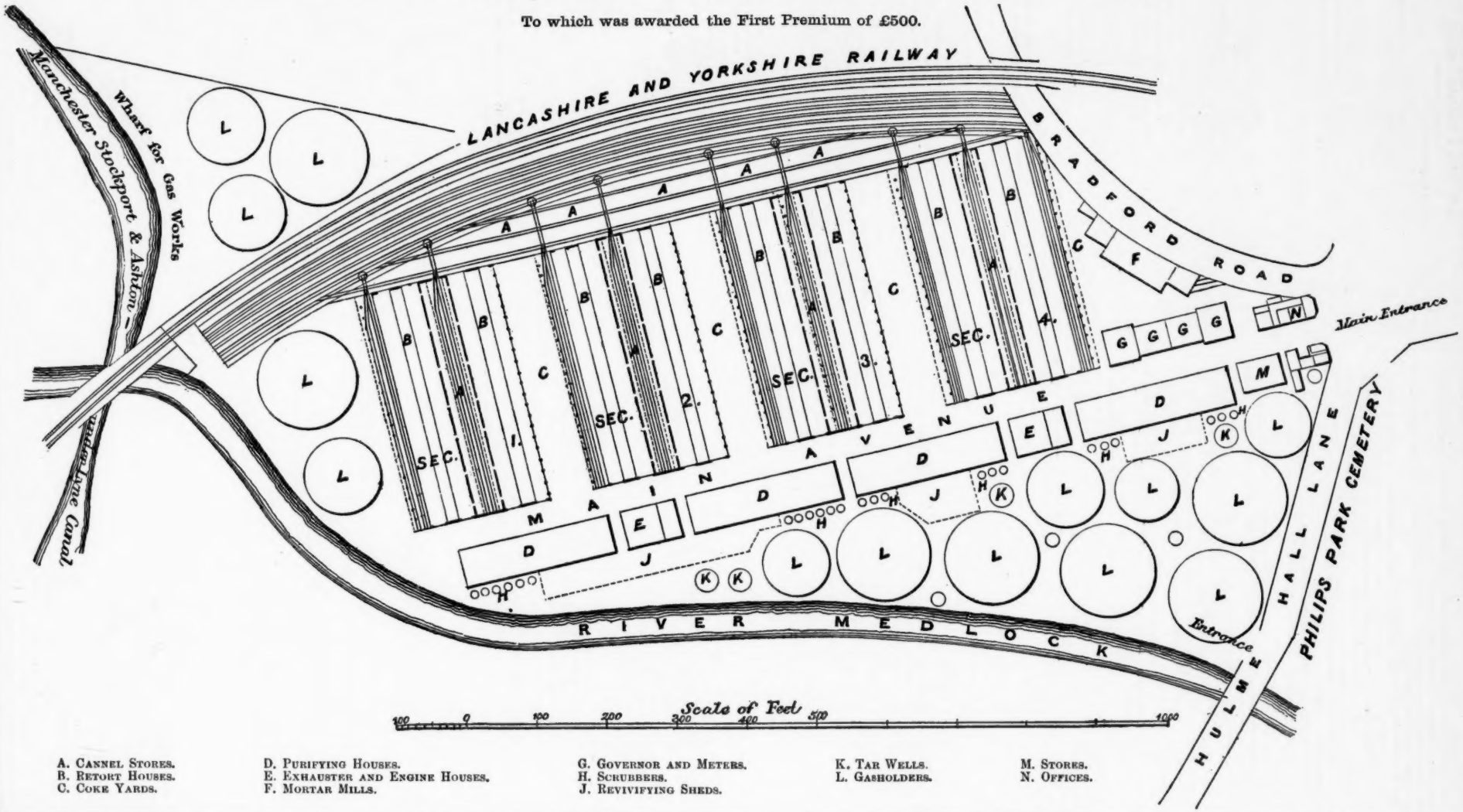
In cross-examination, witness said he had not heard that the sewer-pipe had broken, but it might have been broken without it coming to his knowledge. He admitted that the packing in this instance was insufficient for cast-iron pipes.

Mr. *John Graves Hawkins*, manager of the gas-works, said that the day after the explosion he went to the place and examined it, and found that the gas-pipe in front of the plaintiff's house had been broken. It was a good pipe for the purpose, and appeared to be well laid. With paving stones over it 7 inches thick, it was hardly possible for it to have broken from any weight from above; but it was possible, and in his judgment probable, that the fracture was caused by the subsidence of the earth. Plaintiff told him that when he came home his wife informed him she had smelled the gas very strongly, and that he got a candle to try to find out where it came from. He had no sooner got to the cupboard than an explosion occurred. Plaintiff made no mention of a match, but he (witness) told plaintiff he ought not to have gone to the place with a light of any description, but ought to have sent to the gas-works about it. The pipe was three-eighths of an inch in thickness, which was the average thickness of a 4-inch pipe. There was a space of about 2 inches between the gas and the drain-pipe. He had a staff of men whose duty it was to superintend the mains. When he came to Wigan, in January last, he found the mains were too small,

MANCHESTER NEW GAS-WORKS.

BLOCK PLAN OF MESSRS. MANGNALL AND LITTLEWOODS' DESIGN,

To which was awarded the First Premium of £500.



A. Cannel Stores.
B. Retort Houses.
C. Coke Yards.
D. Purifying Houses.
E. Exhauster and Engine Houses.
F. Mortar Mills.
G. Governor and Meters.
H. Scrubbers.
J. Revivifying Sheds.
K. Tar Wells.
L. Gasholders.
M. Stores.
N. Offices.

and he had to put on extra pressure to enable them to supply the outlying districts with gas.

Mr. *John Jones*, inspector of the gas-pipes, said he went to this place on the night in question, opened the ground, and took out the broken pipe and then closed the place for the night. He had inspected the spot the week before, and found everything all right.

Mr. *Ralph Betley*, borough analyst, said he had examined the pipe produced, and he could find no portion of it so thin as one-eighth of an inch in thickness. It was three-eighths of an inch in thickness, and that was the proper thickness for a pipe of that size. The pipe was a good one, and was hardly corroded at all. He visited plaintiff's premises on the 1st of April, and to the best of his recollection plaintiff said he went to the cupboard with a lighted candle, and that the explosion then occurred.

Adam Haslem, in the service of the corporation, said he had assisted to lay the new mains about eighteen months ago, and they had since broken in one or two places.

William Baker, ironfounder, said he had examined the pipe produced, and it was the proper thickness for a pipe of that size. One foot 11 inches was the proper depth at which to lay a pipe of that description.

Jonathan Thomas, owner of the adjoining property, which had been slightly damaged by mining operations underneath, said the colliery proprietors had promised to pay him for the damage sustained.

Joseph Topping, in the employ of the corporation, said he heard plaintiff say to Jones that he went to the cupboard with a candle, and that the explosion afterwards took place.

Mr. LEES, in replying for the plaintiff, commented on the fact that all the witnesses for the defence were persons in the employ of the corporation.

His HONOUR summed up the case, remarking that there could be no doubt the gas-mains in the street were broken, and that an explosion had taken place in plaintiff's house. It was, however, for the jury to say whether they were satisfied with the evidence which had been adduced to prove how the gas had gained access to the cupboard. It had been urged by the plaintiff's witnesses that it escaped from the main in the street, and found its way under the flooring of the house to the cupboard. If that had not been made out to their (the jury's) satisfaction, there could be no case against the defendants. The evidence of the plaintiff on that part of the case was, that he came home, that in consequence of something his wife said to him he took a candle and tried the gas-pipes and brackets, but failed to find any appearance of gas. Subsequently he went into the shop to get some butter, which was kept in the same cupboard where the meter was. He lighted a match, and immediately he opened the cupboard the explosion occurred. After the explosion, Sherrington and the plaintiff's son examined the meter and the gas-pipes with a Davy lamp, but no gas was observable. Now it seemed there was a hole in the floor, and another in the cupboard through which the service-pipe came up to the meter. Mr. Johnson, in his evidence for the plaintiff, said that after an examination of the place he had come to the conclusion that that was the way in which the gas had got into the cupboard. He, however, stated that he did not lift the floor to ascertain whether that was so or not. It was, perhaps, to be regretted that that had not been done, for had it been done it would have been ascertained beyond all uncertainty. That was the only evidence the plaintiff laid before them on that part of the case. If the jury were satisfied on that point, the question was how the pipe in the street was broken. The plaintiff said it was broken partly from its being improperly laid—that was, being placed too near the surface—and partly because it was an old pipe, and ought to have been removed long ago. It was corroded, it was said, and was improperly packed with cinder, which it was admitted was a bad substance to pack cast-iron pipes with, and that its being placed across a drain-pipe contributed to the fracture. That being so, the plaintiff said it rendered the corporation liable to him for negligence. Mr. Johnson's evidence was in favour of that, and he was corroborated by Mr. Williams. One of the defendants witnesses, however, said it was a very common thing to find service-pipes of that size nearer the surface than 1 foot 11 inches. If they thought that was the cause of the fracture, and if they were of opinion that a new pipe ought to have been laid, then the plaintiff would be entitled to a verdict. Mr. Peace, he said, had alluded to the recent purchase of the gas-works by the corporation, but his Honour was of opinion that if they took the works over in the state they were, the corporation would still be liable for anything of that description. It was not like a distinct act of negligence committed by the old gas company, but was the continual act of wear and tear. The answer to that was that the wear and tear had nothing to do with the fracture of the pipe, and that the pipe was good and sound, and only a little corroded. The defendants witnesses also contended that the pipe was nearly three-eighths of an inch thick, which was its original thickness, and that the accident must have been brought about by the subsidence of the earth owing to mining operations underneath. The next question was as to the immediate cause of the explosion at plaintiff's house. Was the breaking of the pipe by subsidence, if it was brought about in that way, negligence on the part of the defendants to examine the pipe? Mr. Williams said the corporation must have known of the subsidence of the earth in many parts of the town, but they neglected, in many instances, to make matters right. If the escape of gas took place through the neglect of the corporation to look to their pipes after they heard of the subsidence, they were liable. If the jury were satisfied on that point, then came the question whether there had been contributory negligence on the part of the plaintiff. That was a matter that frequently troubled both juries and judges. Plaintiff admitted that he had seen the notices on the back of the gas bills warning any person against using a light when he perceived a smell of gas. He would, therefore, take it that plaintiff was sufficiently informed of his duty in the matter. Then came the question as to how the explosion actually occurred. Plaintiff stated that he was going to the cupboard for some butter, and that he struck a match, and that the explosion instantly took place. Several of the defendants witnesses, on the other hand, said that plaintiff told them, at the time, that directly he came into the house he proceeded with a candle to the cupboard, and that the explosion occurred. If that were so, they would have to find a verdict for the defendants. It was, however, for them to judge.

The JURY retired for a few minutes, and on their return into court gave a verdict for the plaintiff for the full amount claimed.

His HONOUR, on the application of Mr. LEES, allowed costs on the higher scale.

WORSHIP STREET POLICE COURT.—FRIDAY, OCT. 13.

(*Before Mr.* HANNAY.)

CONVICTION FOR GAS STEALING.

Camilla Artz, 45, a bonnet-shape maker, until lately carrying on business in some premises at the rear of the house, 79, Chiswell Street, St. Luke's, was brought up on remand, charged with stealing gas, the property of The Gaslight and Coke Company.

Mr. HUMPHREYS (Humphreys and Morgan) appeared for the prosecution, and Mr. B. J. ABBOTT for the prisoner.

Mr. *Edward Brown* said that he was an inspector in the service of The Gaslight and Coke Company, and knew the prisoner. In April, 1874, witness had an interview with him as to the supply of gas to his premises. A service-pipe was laid on at the time, and a 5-light meter supplied. That went on until February, 1875, when the gas was cut off in consequence of non-payment. The meter was left at the time. Shortly after that, in the same month of February, witness went again to the premises, and then found that the meter had been again connected with the main, and the gas was being used. It had been fixed by the prisoner himself. Witness told him that he had no right to have done it, and afterwards it was cut off, and the meter removed. There had since then been no supply. From April, 1874, to February, 1875, the quantity of gas consumed was 19,500 feet, value about £4.

By Mr. HANNAY: That was when the prisoner was paying for it in the ordinary course. At the same ratio the consumption for the time between February and the end of August, when the matter was found out, would be about 25,000 or 30,000 feet, but there was no meter to check it.

Cross-examined by Mr. ABBOTT: The service-pipe was an iron one, and, of course, was left on the premises. It could not be seen from the outside of the house that gas was being burnt within. The house was a very old one. Prisoner had not, to his knowledge, been to the company and offered to settle the matter.

Mr. HUMPHREYS said that there was an old matter unsettled, and a summons against the prisoner for money due for gas up to February, 1875, was hanging over.

Mr. *Charles Peek* said that he was an inspector in the company's service. In August, in consequence of what came to the company's knowledge, he was sent to the premises, and saw the prisoner. He told him that there had been a complaint of escape of gas and he had come to see about it. The prisoner said that the service-pipe was in the kitchen, and invited him to go down. Witness said that there was one in the shop at the back, and that was the one he had to see. After some demur the prisoner allowed him to go into the shop. Witness then found the gas burning, and a gas-stove also in use. He removed some boxes to get at the service-pipe, and then found that the cap, placed on the service-pipe by the company, had been removed, and a connexion between the pipe and the prisoner's fittings established by a piece of india-rubber tubing, about 2 feet in length. The prisoner, when told that the matter would be reported, as he had been robbing the company, asked if it could not be settled, and if the company would not take the money. Witness told him that he knew nothing about that, and that he had better call and see the manager. He then said he hoped they would not lock him up.

By Mr. ABBOTT: Witness knew that the prisoner had subsequently called to see the manager.

Mr. HUMPHREYS repeated that there was another matter pending. The prisoner had not appeared to a summons, and the warrant was hanging over his head. The place had been shut up since, and the prisoner had kept out of the way. One officer had been repeatedly to his place to endeavour to apprehend him.

Mrs. *Frances Ann Savage*, a widow, said that she occupied the back room of the second floor of the house, 79, Chiswell Street, and had resided there since October, 1875. She knew the prisoner's workshop below, and that he burnt gas, but could only see the reflection of one burner—not of the stove. She had seen the one burner many times, but did not take much notice; nor would have known anything of it, but from the last witness making inquiries.

Mrs. *Mary Ann Griffith*, another lodger in the house, said that she occupied the top floor. She knew the defendant's workshop, and saw through the skylight that he burnt gas; but never took any special notice.

Stephen Morroney, detective constable, G Division, said that a warrant for the apprehension of the prisoner was placed in his hands, and on the 7th inst. he met him in Old Street, St. Luke's. He told him that he should take him into custody, and was about to read the warrant to him, when he said, "I know all about it; you need not read it. It's quite right." He told him that he should take him to the station, and the prisoner then offered to "square" it with him.

Mr. ABBOTT asked the magistrate to deal with the case under the Gas-Works Clauses Act. He said that his client was a foreigner, and told him that he did not intend to defraud, but, finding the gas cut off, and he not able to carry on his business, did foolishly connect it with the india-rubber tube.

Mr. HANNAY said that under the Gas-Works Clauses Act the penalty was only £5, and 40s. a day. He was satisfied it was a bad case, and that the felony was established.

Mr. ABBOTT then said that the prisoner would plead guilty to the robbery rather than go for trial.

Mr. HUMPHREYS observed that the company were ready to take the magistrate's decision. They did not put it on the ground of the loss of gas, but of the public safety.

Mr. HANNAY said the case was clear enough, and he felt bound to pass the full sentence of six months imprisonment, with hard labour.

ACCIDENT AT THE DUBLIN WATER-WORKS.—On Tuesday last, one of the Vartry main-pipes, 38 inches in diameter, in the bed of the Cookstown River, near Enniskerry, burst, causing considerable alarm in the district. The river was swollen from the late floods, with the addition of the water from the bursting pipe. Mr. Andrews, the engineer of the district, was immediately telegraphed for, and he proceeded with a body of men to the scene, and set to work for the repairs of the pipe. The river had to be turned aside in getting at the broken part. It is hoped that the injury will be quickly repaired; meantime, the Water-Works Committee of the city of Dublin have issued notices to the inhabitants, intimating that, during the progress of the necessary works, the supply of water will be delivered at diminished pressure, and may possibly be intermittent. The Water-Works Committee recommend that, wherever practicable, water should be stored, and that in all cases waste should be avoided. The full pressure will be restored at the earliest moment.

DROGHEDA WATER-WORKS COMPANY.—The annual meeting was held on the 3rd inst.—Alderman Dale in the chair. The report of the directors stated that the past season, although unprecedentedly dry, had not caused any interruption to a fair and full supply of water to consumers. For some ten or twelve weeks, in order to be on the sure side, the supply was intermittent, but practically unlimited. This might be ascribed in a great measure to the increased storeage secured by the deepening of the Killineer reservoir, carried out last year, at the well laid-out sum of £230. The balance of £352 14s., as shown on the profit and loss account, would enable the directors to declare a dividend, but until the further deepening of the upper reservoir was carried out, they could not recommend such a course. Applications for the supply of water for steam-boilers were increasing, and the directors were most hopeful as to the future, but again impressed upon the shareholders the necessity of completing the work in such a manner as would ensure a constant and unfailing supply. This could only be done by a further outlay, as already indicated.

PENZANCE WATER-WORKS.—Improved reservoirs at Penzance are now fast approaching completion. The water-works at Penzance have for some time past been undergoing considerable improvement. Large sub-mains have been laid down in lieu of the original ones, which had become choked and corroded by the the puddle-walls did not go nearly so low as the bottom of the reservoir in the action of the water, so as to render clearing them impossible. In No. 2 reservoir northern and parts of the eastern and western embankments, which were generally in a shaky and uncertain condition, and various methods which were tried to keep them together failed. There were also two springs in the bottom of this reservoir, so that it was by no means water-tight, and failed to be of service to the town during the dry summer months. In order to remedy these defects, an inner puddle-wall has been formed so as to prevent the water from the leak on the outside of the northern and eastern embankments, finding its way between the bottom of the puddle-wall and the natural surface. The reservoirs in their new state will not be probably opened for a month.

Miscellaneous News.

METROPOLIS GAS SUPPLY.

METROPOLITAN BOARD OF WORKS.—At the usual weekly meeting of the Board on Friday last, a report was presented by the Works Committee, to the following effect:—"In pursuance of the resolution of the Board of the 29th ult., your committee have had before them the letter from the Board of Trade relative to the auction clauses, inserted at the instance of this Board in the bill of the Chartered Gas Company of last session. The Board of Trade express an opinion, for the reasons stated in their letter, that this Board have been wise in the course they have pursued, and that there is every reason to believe that the unqualified effect of the auction clauses (whatever the statutory dividend) will, taken in connexion with the sliding scale, be to promote economy, and to prevent the raising of unnecessary capital. It does not appear to your committee that the letter requires an answer, and they recommend, therefore, that the reference of the same be discharged. Your committee have also given attention to the portion of the Board's resolution instructing them to report upon the whole question of the course to be taken by the Board in Parliament next session with regard to gas supply, and they beg to state, in reference to this instruction, that, in their opinion, it is not advisable at the present time to determine as to the course which the Board should pursue in the matter." The report was adopted, and, on a motion by Mr. Rogers, it was resolved—"That the Commercial Gas Company's Act of 1875, and the Chartered and the South Metropolitan Gas Companies Acts passed last year (*sic*), be referred to the Works and General Purposes Committee, to examine into and report to the Board upon the operation of any clauses requiring attention, and also to report upon the letter of the Gas Referees relative to the sulphur impurities." The clerk reported the receipt of a letter from The Gaslight and Coke Company, stating that from the 1st of January next the price of gas supplied by them will be reduced—common gas to 3s. 6d., and cannel gas to 4s. 4d.

Abstract of the report of Dr. Williamson, the Chief Gas Examiner to the Metropolitan Board of Works, on the gas supplied by The Gaslight and Coke Company and the South Metropolitan Gas Company during the quarter ending Sept. 30, 1876:—

Illuminating Power.

Description of Gas and Testing-Place.	Max.	Min.	Aver.
The Gaslight and Coke Company—			
Common gas, Beckton	18·8	16·2	17·2
,, Ladbroke Grove	17·8	16·1	16·7
Cannel gas, Millbank Street	24·2	20·0	22·2
Common gas, Devon's Road	18·9	14·8	16·8
,, Carlyle Square	22·4	16·0	18·4
,, Camden Street	18·2	15·9	17·0
,, Graham Road	19·9	15·9	17·9
South Metropolitan Gas Company—			
Common gas, Hill Street	17·8	14·8	16·3

At four of the stations of The Gaslight and Coke Company—viz., Beckton, Ladbrook Grove, Millbank Street, and Carlyle Square—the minimum illuminating power has been equal to or above the requirements of the Acts of Parliament, whilst at the three other stations of the same company—viz., Graham Road, Camden Street, and Devon's Road—the minimum has been but slightly below those requirements. An appeal has been made by The Gaslight and Coke Company with reference to the return of 14·8 candle power in the gas tested at Devon's Road on the 14th of August, and it appeared that this determination was erroneous. Sulphuretted hydrogen has not been present in the gas at any of the testing-stations.

Grains of Sulphur per 100 *Cubic Feet of Gas.*

Description of Gas and Testing-Place.	Max.	Min.	Aver.
The Gaslight and Coke Company—			
Common gas, Beckton	12·3	7·0	9·2
,, Ladbroke Grove	17·9	7·1	13·6
Cannel gas, Millbank Street	16·4	8·4	12·6
Common gas, Devon's Road	13·6	4·8	7·7
,, Carlyle Square	29·4	9·8	18·3
,, Camden Street	13·0	6·7	9·4
,, Graham Road	17·8	10·4	14·2
South Metropolitan Gas Company—			
Common gas, Hill Street	18·8	10·3	14·4

The maximum quantity of sulphur present at all the stations, with the exception of that at Carlyle Square, in connexion with the Fulham works of The Gaslight and Coke Company, has been within the requirements of the Acts of Parliament. At the Fulham works, the amount of sulphur present has, on numerous occasions, exceeded that allowed by the Acts, and an explanation has been tendered, to the effect that the purifiers at those works are not of sufficient efficacy, and that additional ones are accordingly being erected. Ammonia has been present at all of the stations in greater or less quantity during the past quarter, but at Ladbroke Grove, Millbank Street, and Devon's Road, it has appeared rarely, and then only to a slight extent. At Hill Street the quantity has, on two occasions, been in excess of that allowed by the Acts of Parliament.

Dr. Whitmore's report on the illuminating power, pressure, and quality of the coal gas consumed in the parish of Marylebone, supplied by The Gaslight and Coke Company, during August and September:—

AUGUST.	Illuminating Power in Sperm Candles.			Mean Pressure in Tenths of an Inch.		Mean Quanty. of Sulphur in 100 Cu. Ft.	Mean Quanty. of Ammon. in 100 Cu. Ft.	Sulphuretted Hydrogn.
	*Mean of 21 Obser.	Highest.	Lowest.	Highest.	Lowest.	Grains.	Grains.	
Gas supplied from the Fulham works	16·60	17·20	16·04	25·12	8·65	12·12	0·36	No trace
Gas supplied from the Beckton and Bow works	16·57	17·14	16·00	29·32	15·08	11·20	0·53	No trace
Cannel gas supplied from the Pimlico works	20·74	21·14	20·10	18·24	12·42	12·24	0·60	No trace

Mean of daily readings of barometer . . . 29·82
,, ,, ,, thermometer . . . 75·46

SEPTEMBER.	*Mean of 18 Obser.							
Gas supplied from the Fulham works	16·33	17·04	15·94	25·03	8·21	14·89	0·60	No trace
Gas supplied from the Beckton and Bow works	16·31	16·71	15·62	21·40	13·11	9·94	0·43	No trace
Cannel gas supplied from the Pimlico works	20·90	21·80	20·21	25·48	14·36	11·21	0·60	No trace

Mean of daily readings of barometer . . . 29·59
,, ,, ,, thermometer . . . 64·94

*Each observation consists of ten readings of the photometer, at intervals of one minute.

During the months of August and September the mean illuminating power of the gas supplied from the Fulham works was equal to the light of 16½ candles; it ranged between 17·20 and 15·94 candles, and was only once below 16 candles. The mean quantity of sulphur found in 100 cubic feet of gas was, in August, 12·12 grains, and, in September, 14·89 grains; the mean quantity of ammonia found during the former month was 0·36 of a grain, and during the latter month 0·6 of a grain. The mean light given by the gas from Beckton and Bow during the above period was equal to very nearly 16 candles and a half; it ranged between 17·14 and 15·62 candles. The mean quantity of sulphur found in it during August was 11·20 grains, and during September 9·94 grains; in the former month the mean amount of ammonia was half a grain, and in the latter less than half a grain. The cannel gas gave, during the two months, a mean light equal to rather more than 20 candles and a half; it ranged between 21·80 and 20·10 candles, and was, therefore, never below the standard. The mean amount of sulphur found in it in August was 12·24 grains, and in September 11·21 grains, whilst the ammonia showed, in both months, a mean of six-tenths of a grain. During the whole period the pressure of all the gases was fair, and no sulphuretted hydrogen was detected in either of them by the ordinary tests.

METROPOLIS WATER SUPPLY.

The Registrar-General publishes the following returns of the average daily quantity of water supplied by the London Water Companies during the month of September, 1876. According to these, 122,421,732 gallons, or 556,218 cubic mètres of water (equal to about as many *tuns* by measure, *tons* by weight) were supplied daily; or 231 gallons (105·0 decalitres) rather more than a *ton* by weight, to each house, and 32·6 gallons (14·8 decalitres) to each person, against 34·2 gallons during September, 1875. According to returns of the London Water Companies made to the select committee on East London Water Bills (session 1867), it is estimated that, during the year 1866, about 82 per cent. of the total supply of water for all purposes was for domestic use; applying this proportion to the total quantity supplied daily in the month of September, 1876, it may be estimated that about 100,385,820 gallons were used for domestic purposes, or about 26·7 gallons per day for each inhabitant, against 28·0 in the corresponding month of last year.

COMPANIES.	Number of Houses, &c., supplied in Sept., 1875.	Sept., 1876.	Aver. Daily Supply of Water in Gallons* during Sept., 1875.	Sept., 1876.
Total supply	520,099	529,628	126,241,078	122,421,732
From Thames	244,523	249,357	63,704,524	64,672,576
,, Lea and other Sources	275,576	280,271	62,536,554	57,749,156
THAMES.				
Chelsea	28,555	28,675	7,920,500	8,606,800
West Middlesex	47,209	48,440	10,403,570	10,586,545
Southwark and Vauxhall	80,230	80,600	19,275,500	19,200,000
Grand Junction	35,709	36,616	11,838,854	11,126,368
Lambeth	52,820	55,026	14,266,100	15,152,863
LEA AND OTHER SOURCES.				
New River	123,628	124,785	30,633,000	25,138,000
East London	107,851	110,354	25,040,000	25,233,600
Kent	44,097	45,132	6,863,554	7,377,556

* Including that for manufactures and for various purposes other than for domestic consumption.

Note.—The return for September, 1876, as compared with that for the corresponding month of 1875, shows an increase of 9529 houses, and a decrease of 3,819,346 gallons of water supplied daily.

Dr. Frankland, F.R.S., reports, as the result of his analysis of the waters supplied to the Metropolis during September, that, taking unity to represent the amount of organic impurity (on this occasion) in a given volume of the Kent Company's water, the proportional amount in an equal volume of water supplied by each of the other metropolitan companies was—New River 1·4, Chelsea 1·9, West Middlesex 1·9, East London 2·0, Grand Junction 2·1, Lambeth 3·1, and Southwark 3·4. The Southwark and Lambeth Companies delivered water, which, through inefficient filtration, was slightly turbid, and contained moving organisms. With these exceptions, the river waters supplied by the London Companies were clear and transparent, and contained, as in August, a remarkably small proportion of organic impurity. The East London Company's water, owing to long storeage, showed but slight traces of "previous animal contamination." The Kent Company's deep well water was of its usual excellent quality.

Dr. Whitmore's report on the composition of Thames companies and other waters supplied to Marylebone during August and September:—

AUGUST.	Total Solid Matter in degrees or grains per Imperial gallon.		* Loss by Incineration of Solid Matter in previous column.		Hardness before boiling, in degrees.	Hardness after boiling, in degrees.
	Aug., 1875.	Aug., 1876.	Aug., 1875.	Aug., 1876.		
	0°	0°	0°	0°	0°	0°
Distilled Water						
West Middlesex	19·44	17·48	0·88	0·68	11·80	2·60
Grand Junction	20·40	17·68	0·96	0·88	12·00	2·60

	Chlorine, in Grains, per Gallon.	Parts per Million. Free Ammonia.	Albumenoid Ammonia.
West Middlesex	1·10	0·00	0·06
Grand Junction	1·01	0·00	0·07

SEPTEMBER.	Total Solid Matter in degrees or grains per Imperial gallon.		* Loss by Incineration of Solid Matter in previous column.		Hardness before boiling, in degrees.	Hardness after boiling, in degrees.
	Sept., 1875.	Sept., 1876.	Sept., 1875.	Sept., 1876.		
	0°	0°	0°	0°	0°	0°
Distilled Water						
West Middlesex	19·20	17·52	0·80	0·80	12·30	2·60
Grand Junction	20·09	18·64	0·88	0·88	12·70	2·70

	Chlorine, in Grains, per Gallon.	Parts per Million. Free Ammonia.	Albumenoid Ammonia.
West Middlesex	1·12	0·00	0·08
Grand Junction	1·13	0·00	0·09

* The loss by incineration represents the amount of organic and other volatile matters contained in the Imperial gallon (70,000 grains) of water.

During the month of August the water of both companies, as seen through a glass tube, 2 feet in length, was perfectly clear and bright; in the early part of September, the water of the Grand Junction Company was, on one or two occasions only, slightly turbid.

LONDON GASLIGHT COMPANY.

The Ordinary Half-Yearly Meeting of Shareholders was held at the Freemasons Tavern, Great Queen Street, on Wednesday, Oct. 11—MAJOR ROHDE HAWKINS, Esq., the Governor, in the chair.

The SECRETARY (Mr. Dove) read the notice of meeting, and the seal having been affixed to the register, the following report and accounts were presented:—

Annexed to this report your directors submit the half-yearly accounts, which show the result of the manufacture and distribution of gas to June 30, 1876.

Taking advantage of the existing low prices of materials, your directors made a further reduction in the charge for gas in the company's district. A notice was, therefore, issued to the consumers reducing the price of common gas from the 1st of January last to 3s. 6d. This reduction has given to the consumer a pecuniary advantage of £13,329 10s. 10d., the gas-rental for the half year showing a diminution to that amount, while the results have proved that the decision of your directors was well grounded. After reserving £11,103 5s. 9d., the amount required for dividends on the preference capital, and appropriating £750 to the redemption-fund, in accordance with the provisions of the London Gaslight Act, 1857, the sum of £26,282 6s. 6d. remains applicable to dividend on the ordinary capital, and an addition will be made to the reserve-fund. The directors, therefore, recommend that the usual dividends be declared—viz., on all classes of preference stocks and shares at their respective rates, and at the rate of £10 per cent. per annum on the ordinary stock.

The bill for the regulation of the metropolitan gas companies, promoted by the Metropolitan Board of Works, and referred to in the last report, was withdrawn in the presence of a bill introduced by the Board of Trade, and supported by the Metropolitan Board of Works and the companies affected by it. The Select Committee of the House of Commons to which the bill was referred having, however, proposed to introduce terms to which the companies as well as the promoters felt they could not give their assent, the bill was withdrawn by the Board of Trade.

No. 1.—STATEMENT OF STOCK AND SHARE CAPITAL, *on June* 30, 1876.

Acts of Parliament relating to the Raising of Capital.	Description of Capital.	Maximum Dividend authorized.	Number of Shares issued.	Nominal Amount of Shares.	Called up per Share.	Total paid up.	Arrears of Calls.	Remaining to be called up and unissued.	Total Amount authorized.
15 Vict., cap. 82	Ordinary stock.	10 per cent.	Stock	Stock	Stock	£383,700	..	..	£383,700
	2nd pref. „ .	6 ditto.*	Do.	Do.	Do.	11,000	..	..	11,000
	3rd ditto „ .	6 ditto.*	Do.	Do.	Do.	2,450	..	..	2,450
	1st ditto „ .	6 ditto.	Do.	Do.	Do.	150,000	..	..	150,000
29 Vict., cap. 55.	A ditto shares .	6 ditto.	11,874	£25 0 0	£20 and £1 5s.	184,975	£250	£111,625 & £3,150	300,000
20 & 21 Vict., cap. 73	Debenture stks.	5 & 6 ditto.	Stock	Stock	Stock	26,692	..	..	26,692

* With option of conversion.

No. 2.—STATEMENT OF LOAN CAPITAL.

Acts of Parliament authorizing the Loan Capital.	Description of Loan.	Rates per Cent. of Interest.		Total Amount borrowed.	Remaining to be borrowed.	Total Amount authorized.
		4½ per Cent.	5 per Cent.			
15 Vict., cap. 82	Bond, &c.	£72,460	£15,952	£88,412	£91,112	£91,667
29 Vict., cap. 55	Ditto					100,000

No. 3—CAPITAL ACCOUNT.

—	—	Description of Capital.	Certified Receipts to Dec. 31, 1875.	Received since that date.	Total Receipts to June 30, 1876.
To Expenditure to Dec. 31, 1875	£830,324 4 4	By Ordinary stock	£383,350 0 0	*£350 0 0	£383,700 0 0
Less—		2nd Preference ditto.	11,050 0 0	†	11,000 0 0
Excess in wear and tear of retorts. £98 0 0		3rd ditto ditto.	2,750 0 0	‡	2,450 0 0
„ meters returned to store 54 17 5		1st ditto ditto.	150,000 0 0	..	150,000 0 0
	152 17 5	A ditto shares, £25 each, including amount received in anticipation of calls	177,760 0 0	7,215 0 0	184,975 0 0
	£830,171 6 11	Debenture stocks, under 20 & 21 Vict., cap. 73	26,692 12 6	..	26,692 12 6
Balance	10,642 12 6	Bonds and other loans	137,642 0 0	‖	88,412 0 0
Total expenditure.	£840,813 19 5	*Note* † £50 converted into ord. stock			
Balance	6,415 13 1	‡ £300 „ „ „			
	£847,229 12 6	* £350			
		‖ £49,230 paid off.	£889,244 12 6	..	£847,229 12 6

No. 4.—REVENUE ACCOUNT.

To Manufacture of gas—			By Sale of gas—		
Coals, including dues, carriage, unloading, and trimming (see Statement No. 8)	£49,646 7 4		Common gas, per meter, at 3s. 6d. per 1000 cubic feet	£88,478 0 1	
Salaries of engineers, superintendents, and other officers at works	1,802 18 5		Cannel gas, per meter, at 4s. 8d. per 1000 cubic feet	6,839 8 4	
Wages (carbonizing)	10,491 19 5		Public lighting, and under contracts—		
Purification, including £964 5s. 8d. for labour	1,493 10 1		Common gas	9,322 16 5	
Repairs and maintenance of works and plant, materials, and labour, less £121 15s. 11d. received for old materials	12,798 7 6		Cannel gas (See Statement No. 10.)	1,336 15 3	
		£76,233 2 9		105,977 0 1	
The Gaslight and Coke Company, for cannel gas		6,736 11 10	Rental of meters	1,991 15 6	
Distribution of gas—					£107,968 15 7
Salaries and wages of officers (including rental clerks)	2,109 18 10		Residual products—		
Repairs, maintenance, and renewals of mains and service-pipes, including labour	1,801 4 9		Coke, less £1734 15s. 3d. for labour and cartage	21,339 16 2	
Repairs and renewals of meters	1,557 1 8		Breeze, less £307 3s. 2d.	741 12 7	
		5,468 5 3	Tar, less £31 5s.	6,604 11 10	
Public lamps—			Ammoniacal liquor, less £12	4,518 0 0	
Lighting and repairing		1,556 14 2			33,204 0 7
Rents, rates, and taxes—			Rents receivable		1,444 8 0
Rents payable	937 0 0		Transfer fees		8 7 6
Rates and taxes	3,937 7 10				
		4,874 7 10			
Management—					
Directors allowance	900 0 0				
Company's auditors	75 0 0				
Salaries of secretary, accountant, and clerks	1,156 5 6				
Collectors commission	1,905 11 10				
Stationery and printing	421 14 3				
General charges	446 10 11				
		4,905 2 6			
Law charges		853 1 8			
Parliamentary charges (oppositions)		69 6 8			
Bad debts		489 17 4			
Depreciation-fund for works on leasehold land		100 0 0			
Superannuations, sick allowances, and gratuities		527 11 6			
Repairs of houses		71 1 1			
Total expenditure		£101,885 2 7			
Balance carried to net revenue account, No. 5		40,740 9 1			
		£142,625 11 8			£142,625 11 8

No. 5.—PROFIT AND LOSS (NET REVENUE ACCOUNT).

Interest on bonds to June 30, 1876	£2,685 17 2	Balance from last account	£29,684 15 4
Dividends on preference capital	11,103 5 9	Less dividend on ordinary capital for the half year ending Dec. 31, 1875	19,167 10 0
	£13,789 2 11	Amount carried to reserve-fund to Dec. 31, 1875	£10,517 5 4
Interest on temporary loans	37 5 2		
Redemption-fund, reserve per London Gaslight Act, 1857	750 0 0		
Balance applicable to dividend on ordinary capital	26,282 6 6		
	£40,858 14 7	Amount from revenue account, No. 4	£40,740 9 1
		Interest on moneys on deposit	118 5 6
			£40,858 14 7

No. 6.—RESERVE-FUND.

Balance on June 30, 1876	£35,741 0 4	Balance on Dec. 31, 1875	£34,836 11 4
		Interest on amount invested	387 3 8
		Amount brought from net revenue for the year 1875	10,517 5 4
	£35,741 0 4		£35,741 0 4

No. 7.—DEPRECIATION-FUND (FOR WORKS ON LEASEHOLD LAND).

Balance on June 30, 1876	£1,500 0 0	Balance on Dec. 31, 1875	£1,400 0 0
		Amount brought from revenue account for the half year ending June 30, 1876	100 0 0
	£1,500 0 0		£1,500 0 0

No. 8.—STATEMENT OF COALS.

Description of Coal.	In Store, Dec. 31, 1875.	Received during the Half Year.	Carbonized during the Half Year.	Used for Sundries during the Half Year.	In Store, June 30, 1876.
	Tons.	Tons.	Tons.	Tons.	Tons.
Common	5817	57,746	57,772	24	5767
Cannel	921	1,591	1,633	..	879

No. 9.—STATEMENT OF RESIDUAL PRODUCTS.

Description of Residual.	In Store, Dec. 31, 1875.	Made during the Half Year (estimated).	Used during the Half Year (estimated).	Sold during the Half Year.	In Store, June 30, 1876.
Coke, chaldrons of 36 bush.	3,430	58,413	15,807	42,980	3,056
Breeze, " " "	1,600	6,458	..	7,180	878
Tar, gallons	128,000	584,723	..	588,723	124,000
Am. liqr., butts of 108 gals.	2,250	10,907	..	11,065	2,092

No. 10.—STATEMENT OF GAS MADE, SOLD, &c.

Description of Gas.	Quantity (measured by Station Meters). Made.	Purchased.	Quantity Sold. Public Lights and under Contracts (estimated).	Private Lights (per Meter).	Total Quantity Sold.	Quantity used on Works, &c.	Total Quantity accounted for.	Quantity not accounted for.	Number of Public Lamps.
	Thousands.	Thousands.	Thousands.	Thousands.	Thousands.	Thousands.	Thousands.	Thousands.	
Common	585,040	..	41,059	505,337	546,396	5,394	551,790	33,250	4,060
Cannel	..	35,927	4,216	29,312	33,528	5	33,533	2,394	829

BALANCE-SHEET.

To Capital—		
For balance, per account No. 3		£6,415 13 1
Net revenue—		
For balance, per account No. 5		26,282 6 6
Reserve-fund—		
For balance, per account No. 6		35,741 0 4
Depreciation-fund (for works on leasehold land)—		
For balance, per account No. 7		1,500 0 0
Redemption-fund		3,368 10 6
Interest on bonds and other loans, for amount due to June 30, 1876		1,516 9 7
Preference dividends, ditto		11,103 5 9
Unclaimed dividends		4,277 13 4
Sundry tradesmen and others, for amount due for coals, stores, and sundries		24,375 2 7
		£114,580 1 8

By Cash at bankers, and in hand		£14,638 3 2
Amount invested—		
Reserve-fund		35,741 0 4
Stores on hand, viz.—		
Coals	£6,842 1 11	
Coke and breeze	1,646 10 9	
Tar and ammoniacal liquor	1,743 15 0	
Sundry stores	2,699 18 10	
		12,932 6 6
Accounts due to the company—		
Gas and meter rental, quarter ending June 30, 1876	£35,381 15 5	
Ditto ditto, arrears outstanding	2,445 16 11	
	£37,827 12 4	
For coke and other residual products	11,616 3 7	
Sundries	1,824 15 9	
		51,268 11 8
		£114,580 1 8

The GOVERNOR: Gentlemen, it is now my duty to move—"That the report of the directors, and the accounts now laid before the meeting, be received and adopted." But before moving that, I should like, according to usual custom, to say a few words on our present position. The accounts, as you have all had them in your hands for a long time, I need not go into the detail of. You have seen that they are in a very satisfactory state, and that we have been able to do a good thing for the public by reducing the price of gas, while at the same time we are not only able to pay our full dividends to the proprietors, but to carry a very substantial sum forward to the reserve-fund. This is a very gratifying thing to us, and I am quite sure that you, gentlemen, will feel very grateful to the staff of the company—to Mr. Morton and his assistants for the admirable way in which they have manufactured our gas, and to my friend, Mr. Dove, and his assistants for the satisfactory manner in which they have managed to purchase coals, and to dispose of our residual products. The result is, as I say, that we are able to do a good thing for our customers as well as for ourselves. So much, then, for what I may call our domestic policy. As far as regards our foreign policy, you are all aware that the Metropolitan Board brought in a "Regulations Bill" in the last session of Parliament. But the Chartered, the Imperial, and the South Metropolitan Companies had all bills of their own before the Legislature, in which they accepted the main principle of the Regulations Bill—viz., the sliding scale—so that really the only companies affected by the bill of the Metropolitan Board were our own, the Phœnix, and the Surrey Consumers Companies. There were several clauses in that bill which we strongly objected to, and, therefore, we opposed it; but as time went on we received an intimation from the Board of Trade, that if the gas companies affected by the bill could propose anything like reasonable terms, they would be willing to act as negotiators between us and the Metropolitan Board. The result was that the companies met and drew up certain clauses, and the arrangements they proposed were so far satisfactory that the Board of Trade at once adopted them, and recommended their acceptance by the Metropolitan Board of Works. The latter Board, after some considerable discussion, and without any material alterations, adopted these regulations. In point of fact it came to this—that we were willing, with slight modifications, to accept the terms which the Chartered Company had already accepted, and which had been granted by a committee of the House of Commons. Had that bill been carried through, the whole of London would have been placed under uniform conditions of supply, which was what the Metropolitan Board and the Board of Trade stated they wished to accomplish. However, unfortunately, the Board of Trade wanted to do something more. They have a hobby, and that hobby, in this case, was amalgamation. In order, therefore, to carry out their idea about amalgamation, they thought it necessary to introduce the South Metropolitan Company into the bill, although at the very time the South Metropolitan Company had been put down to 3s. 6d. as an initial price, the Chartered having accepted 3s. 9d., and 3s. 9d. being the price which the Board of Trade and the Metropolitan Board had stated they considered a fair initial price for the other companies. Of course the attempt to introduce a company which a committee of the House of Commons had already stated ought to be satisfied with 3s. 6d., threw discord into the whole thing; the session was nearly at an end, there was no time to fight out the question, and therefore the bill was withdrawn. I cannot say I regret it, for it leaves us under the same terms upon which our capital was raised, and which have worked very satisfactorily for ourselves and the public—I mean the Act of 1860. I have always looked upon that Act as a fair one, which, while it secured the property of the shareholders, gave great advantages, from time to time, to the public. This is very evident from the fact that, while we have received the full dividend assigned to us by the Legislature, the public have had a gradual reduction in the price of gas from 4s. 6d. in 1860 to 3s. 6d. at the present time. I do hope, therefore, that after some eight years of "meddling and muddling" on the part of the Metropolitan Board of Works, and I am sorry to add also of the Board of Trade, we may now pass to a quiet time, and be allowed, without further interruption, to do the best we can for the public and ourselves. I now move the adoption of the report.

Mr. RHODES seconded the motion, which was put and carried.

A PROPRIETOR wished to know if there was any probability of the remaining portion of the stock being called up.

The GOVERNOR: Not for a very long time, I hope. The next resolution is—"That the following dividends be now declared—viz., the fixed dividends upon all classes of preference stocks and shares, and a dividend at the rate of 10 per cent. per annum upon the ordinary stock; such dividends to be payable on the 16th inst."

The Hon. A. KINNAIRD seconded the motion, which was put and carried.

The GOVERNOR: Gentlemen, that would be all our business to-day, but I have already explained to you how much we consider ourselves indebted to the energy and skill, both of the secretary and his staff, and of the engineer and his staff. Therefore before we part, I should like to propose on behalf of the directors, and I am sure it will be seconded by the proprietors at large, that the thanks of the meeting be given to those gentlemen for the efforts they have made for our advantage.

The motion was seconded and carried unanimously.

The SECRETARY acknowledged the vote for himself and Mr. Morton. He said: I beg most cordially to thank the governor and the meeting for the very handsome way in which you have recognized our services. I believe I may say candidly that a more united staff do not exist in London. We all work together in the most harmonious manner, and the interest of the company is the foremost thought in the mind of every one connected with us. The energy and zeal which I see displayed in the matters that come before me every day are exceedingly gratifying to my mind. I beg to thank you most cordially on my own behalf, and on behalf of the other members of the staff for the vote you have just adopted.

On the motion of Mr. FORD, a vote of thanks was given to the directors for their services, and the GOVERNOR acknowledged the same.

The proceedings closed with a vote of thanks to the auditors.

NEW YORK WATER SUPPLY.—An official notification has been issued requesting the population of New York to carefully abstain from wasting Croton water. The notice states that continued dry weather has so dwindled and reduced the streams which feed the Croton River that a large quantity of water has had to be drawn from the lakes and storeage reservoirs in Putnam county.

PROPOSED PURCHASE OF THE SHREWSBURY WATER-WORKS.—A special meeting of the Town Council was held on the 9th inst., to receive a report from a committee in reference to the purchase of the water-works. It stated that the present capital of the company consisted of 586 shares of £50, and £6000 which had been raised on mortgage, making a total of £35,300. Dividends at the rate of 5 per cent. per annum have been paid by the company for several years past. The water-rental shows a steady increase, having gone up from £3052 in 1871 to £3423 in 1875. The works and plant of the company are said to be in good repair, and sufficient for present requirements. The committee recommended that the sum of £41,160 be offered the company. It is proposed to borrow the sum required to complete the purchase, the money to be repaid by instalments in thirty years. It is calculated that for the first five years a rate of 2d. in the pound will be needed, and for ten years of 1d., after which, if the present income is maintained, there will be no further cost to the public. Mr. White moved, and Mr. Crump seconded, the adoption of the report. Mr. J. Cross suggested that a good supply of pure water could be got from Church Stretton for £9000, but the town-clerk stated that it could not be done without an Act of Parliament. Considerable discussion took place upon the report, and it was eventually agreed to adjourn the meeting for a fortnight.

NEWCASTLE-ON-TYNE WATER SUPPLY.—At the meeting of the Newcastle Town Council on the 4th inst., the Water Committee made a report in respect to the water supply of the borough upon a previous reference to them. In the course of their report they stated that they had invited the attendance of Mr. Main, the secretary of the water company, and that gentleman furnished the committee with several valuable details respecting the water supplied to the borough, and the present condition of the works of the company. The area of the ground purchased by the water company for the new filters at Throckley is 135,332 square feet, which will filter effectually upwards or 10 million gallons per day. Three filters are completed, and have been in operation during the last two months; and a fourth is so near completion that it will be in operation during the present week. Two others are in course of construction. The areas of the filters completed are:—No. 1, 19,044 square feet; No. 2, 12,600 square feet; No. 3, 10,440 square feet; No. 4, 9000 square feet; No. 5 (in course of construction), 23,318 square feet; No. 6 (in course of construction), 26,520 square feet; total, 100,922 square feet. These will filter effectually 7,500,000 gallons per day, the present consumption for domestic purposes being rather more than 6 million gallons per day. The remaining ground, consisting of 34,410 square feet, will be converted into filters as the demand arises, and will be capable of filtering effectually 2,500,000 gallons per day, which, with those now finished and in course of construction, will give a filtering capacity of 10 million gallons per day. From August, 1875, to February, 1876, the company have expended £5450 on the construction of filter-beds, and from February to August, 1876, £7688, making a total expended in the year of £13,138. The filtering material through which the water will pass before distribution to the town is 5 feet in thickness—viz., sand, 2 feet; fine gravel, 6 inches; coarse gravel, 1 foot; stone chips, 1 foot 6 inches; total filtering material, 5 feet. The company have not pumped any water from the river Tyne during the present year, either for domestic or manufacturing purposes.

PROPOSED PURCHASE OF THE WARRINGTON GAS-WORKS.

At the Monthly Meeting of the Warrington Town Council, on the 3rd inst.—the MAYOR (Mr. S. M. Webster) presiding,

The committee appointed to negotiate for the purchase of the gas-works made a report on the subject, in which they stated that the profit of the company, after payment of interest on loans, and all charges for the twelve months ending June 30, 1876, was—For six months ending Dec. 31, 1875, £3260 15s. 3½d.; for six months ending June 30, 1876, £3401 4s. 3d. The company's properties and effects were in first-class order and condition; indeed, they had learnt that the plant had been almost entirely renewed during the last twelve years. The balance-sheet showed that the following cash would be available to the corporation for payment of bonus, parliamentary expenses, and carrying on the manufacture of gas—viz., accounts owing for gas, &c., less discount and contra accounts, £9697 13s. 6d.; Parr's Banking Company, £3600 5s. 10d. less amount required to pay half year's dividends, £2682; cash in hand, £31 11s. 7d. In addition to which there was the amount of reserve-fund, £3391 6s. 5d., invested in 3 per cent. Consols. Since obtaining their new Act in 1871, the gas company had called up £8 per share upon their 3600 new shares, making £28,800, which had been laid out in plant, &c., with the exception of £7200, called up recently. In applying for an Act, the Parliamentary Committee would probably capitalize the annuities at 4 per cent., or 25 years purchase, which would amount to £153,000, and would, no doubt, require the corporation to create a sinking-fund, for the gradual redemption of this amount. Taking the Bolton Gas Act of 1872, and the Birmingham Gas Act of 1875, as precedents, the amount of purchase would have to be paid off in 75 years, or at the rate of £2040 per annum, commencing in three years from the date of the Act. The amount of capital which the gas company had still uncalled up on their new shares is £43,200, and taking the last five years (during which they had called up £28,800 of additional capital) as an index of the rate of increase, it was fair to assume that the whole of the £43,200 would be required during the next eight years, or at the rate of £5400 per annum. This amount could, no doubt, be borrowed by the corporation as required, at 4 per cent., and with a similar proviso in their Act for a sinking-fund as was obtained by the Bolton Corporation in their Act of 1872, which says: "The corporation shall not, after the passing of this Act, be required to set apart for any sinking-fund directed by any of their former Acts any sum in respect of their mortgage debt contracted under those Acts respectively, until the first day of January, One thousand eight hundred and seventy-five, on which day and thenceforth annually on the same day they shall set apart as a sinking-fund for the payment of that debt, and of the further money borrowed under any of their former Acts and this Act, the sum of one pound and five shillings per centum on the total amount of such debt, and further money until thereby or otherwise the whole of such debt and money has been fully paid, and the sinking-fund shall in each case be set apart out of the respective fund or account on which the debt or money in respect whereof it is set apart is charged." After giving a tabulated statement, the report says: "There would be a balance of £7128 6s. in the hands of the corporation at the end of eight years, after providing for sinking-fund as required, in addition to which there would be interest accruing on balance in hand, and on second sinking-fund; and the increased introduction of gas ought to, and no doubt would, increase the profit. With these figures before us, we have thought it in the interest of the borough to act on the instructions of the council, and conclude the purchase of the gas-works on the terms set forth in the minutes of the General Purposes Committee, on the 24th day of July last, and confirmed by the council."

The MAYOR moved the confirmation of the minutes of the committee, and in doing so he said the purchase had been undertaken solely for the benefit of the ratepayers, and not for the personal benefit of any single individual or body of men. A committee had been appointed by the council to negotiate with the directors, and for several months they had been engaged in those negotiations at considerable trouble and inconvenience to themselves. After coming to a certain arrangement, it was submitted to the council, and at the last meeting some questions were asked, and as far as it was possible they were replied to. Amongst other things he stated that the profits of the gas company for one year were upwards of £7000, and that had been obtained for £6000, leaving a balance of £1000 clear. He also said that in addition to this during the last few years upwards of £7000 had been added to the reserve-fund, and that for the last 20 years or more the full statutory dividend had been paid to the shareholders. For many years there had been a continuous increase in the manufacture of gas, and also of the quantity sold. For the year ending June, 1875, the increase of gas sold was upwards of 7 million cubic feet, and for the year ending June, 1876, the increase was more than 8 million cubic feet, showing a continuous increase, and also a similar increase in previous years. It had been shown that there was no personal interest to be served in reference to the purchase, but the committee had acted for the good of the entire community, and he felt sure that in a few years the works would be a source of considerable emolument to the town, if not at the present moment. The council would have to go to Parliament, and the ratepayers would have an opportunity of expressing their opinion on the matter when they were asked for their consent. He did not think that Parliament would inflict on Warrington more onerous terms than had been put upon any other place, and fixing the lowest possible estimate upon the terms granted to Bolton and elsewhere, the committee had arrived at the conclusion that they would have a balance of upwards of £7000 in the hands of the corporation at the end of eight years, after paying every farthing which the terms of the purchase required them to do.

Mr. J. HARRISON, referring to the report of the committee, said he was struck with the fact that the basis of the purchase was the year's profits ending June 30, 1876. He hardly thought that was a fair way of doing it, but that three, or four, or more years average of profits should have been taken, particularly as last year, owing to the low price of coal, had been an exceptionally good one for the gas company. The report stated that while it only showed the actual moneys called up on the shares, &c., it in no way represented the marketable value of the property. He maintained that, so far as the shareholders were concerned, it did; for the maximum of their profits was fixed by statute—viz., 10 per cent. on the old shares, or £36,000 paid up, and 7 per cent. on the new shares, or £28,800 paid up, which would make a total annual profit of £5616, and that, say at 25 years purchase, would amount to a capital sum of £140,400. That, he contended, was a fair price, and the true marketable value; but the council were going to give £154,830, or £14,430 in excess, as he submitted, of the real value. He submitted that the £43,200 uncalled up capital ought not to form an element of value, as it might or might not be called up, and it did not at all follow that if it were called up it would necessarily earn for the shareholders 7 per cent. Then it was said, "that during the last five years £28,800 had been called up for extensions, &c., which was earning 7 per cent.; and therefore, after the same ratio, it was fair to assume that the £43,200 of unpaid up capital during the next eight years, after the rate of £5400 per annum, would be required." Now, he believed that about £17,000 of that £28,800 had been expended in paying off debentures and other liabilities; therefore the tabular statement in the report, showing a balance of £7128 6s. to the credit of the corporation, was quite fallacious. Then, again, there was another vital question, which the advocates for the purchase had admitted for the first time in this report—viz., that Government would require the corporation to establish a sinking-fund for the redemption of the proposed perpetual annuities (when capitalized) of £153,000. It was assumed that they should have allowed them 75 years in which to do it. Granted that they had, that would require £2040 per annum. Then what became of the promised £1000 or £1500 profit? But suppose they were only allowed 50 years, which he thought a much more likely result, seeing that the corporation's indebtedness only amounted to about £70,000, and that the gas-works were to be so profitable to the town, then the sinking-fund would require an annual payment of more than £3000, so that to meet it the price of gas, instead of being reduced, would have to be increased. What would the consumers say to that? Then, again, the anticipated profits were based on the assumption that Warrington would go on increasing as it had done for the past 15 years. He did not think it safe ground to go upon. Warrington might, and probably would, have a check, and a non, or a comparatively small, increase only in the consumption of gas, would tell unfavourably upon the venture. Then, again, suppose the price of coals were to increase materially, as would certainly be the case when trade revived. He did not make these suggestions in any spirit of hostility to the proposed purchase, but simply from a desire to afford the ratepayers all the information he could, to enable them to judge for themselves.

Alderman DAVIES, after replying at some length to remarks which had appeared in the local papers as to the want of information on the subject of the purchase, said he believed the property was a valuable property, and to his knowledge the company had paid 10 per cent. for 30 years. They had not asked for any extra advance on their profit; they had said, "Give us the dividend we are entitled to receive, and which we can well earn, and give us likewise a reasonable discount upon the money which we intend to call up under the powers of our Act of Parliament, and some little consideration that will make us sell our property." They consented to 10s. per share. In Bolton the corporation were glad to give £2 per share; in Bolton they gladly paid for the annuitants their income-tax. In Warrington the shareholders paid their own income-tax. The shareholders had met them in a very handsome manner, and he tendered his warmest thanks to the directors for the generous way in which they had met the corporation, as he felt sure they had solely been actuated with a desire to benefit the town.

Alderman HOLMES said he believed the corporation were doing a good thing for the interest of the town; for through the purchase of the gas-works, and with judicious management, they would be able to hand down to future generations property worth something like £10,000 a year. If he lived many years longer, and this thing was carried out, he would be proud to think that he had been one of the four gentlemen who had assisted to bring about such a permanent benefit to the town.

Mr. FELL said the most important thing about it was the power of production of the works. It was on that depended the value of the purchase; for it was not what it was worth at present, but what it would be ultimately. So far as the future increase was concerned, they could only estimate that from the past. It appeared to him that the consumption of gas doubled itself every ten years, and that was literally correct, as proved by the returns of the gas company. Of course, the increase in the consumption depended on the increase of the borough, and he did not see why Warrington should not increase in the future as it had done in the past.

After some further conversation, in which a general approval of the course proposed was expressed,

The minutes of the committee, confirming the purchase of the works, were approved.

ROCHDALE CORPORATION GAS-WORKS.

At the Meeting of the Rochdale Town Council on the 5th inst.—the MAYOR (Mr. Littlewood) presiding,

Replies were presented from the various Spending Committees to a circular issued by the Finance Committee urging upon them the necessity of casting up their probable expenditure on capital account during the next four years, with a view to an application to Parliament for further borrowing powers. The Gas Committee estimated their requirements at £150,000.

Alderman SIMPSON remarked that the committee would be compelled, naturally and necessarily, to extend their works, or they must cease to supply the town and neighbourhood with gas, and that was the reason they came before the council with such a large expenditure in prospect. The consumption this year was nearly equal to the productive power of the works. They had at present in working order 338 retorts, which were all in operation last year. There would be none additional at work this winter, but with the mechanical stoking and the better material used they might possibly get through without experiencing any deficiency in the supply; but next winter they would be necessarily compelled to have a considerable number of additional retorts. With the present house extended they could put up 84 new retorts. It was estimated that in the winter of 1877-8, 37 new retorts, at the very least, would have to be put in; in the following year, if the demand went on increasing as at present, 41 additional retorts would be required; and in the winter of 1879-80 it was estimated that at the very least 450 retorts would be needed, whereas the total number they could put in at the old works was only 422. It behoved them, therefore, to look about at once, and he thought it would take them all their time, even if they commenced operations at once, to provide an additional supply when it was needed. At the present rate of increase they doubled their consumption of gas once in eight or nine years, and as their estimate might seem a very large one, it was necessary this fact should be borne in mind. The scheme for erections on the new site would be developed as circumstances might require, extensions being made as the necessity for them arose; but though the new site contained 19 acres, it was estimated that in twenty years the whole of it would be occupied. The committee, therefore, now merely asked for as much money as would enable them to divert the river, construct a siding by which the coal and cannel might be brought directly into the works and the residual products carried away, and the construction of such works for the further production of gas as he had shown would be imperatively required during the next four or five years. The committee thought a better site for the purpose could not be found, and they asked the council to give them power to take all the land that had been scheduled, because no other land was so equally available, and it would not do in eight or nine years to have to seek other land which would probably not be in such a good situation. In conclusion, he reminded the council that all spent hitherto on that department had been reproductive, and considering the golden eggs, they must nurse the goose which laid them.

Alderman TAYLOR asked whether the existing works could not be extended.

Mr. ROBINSON asked when the council were required to complete the purchase of the land in question. Could it not be put off for a year or two?

Alderman SIMPSON said their necessities would not bear putting off. In reply to Alderman Taylor, he remarked that they had no land sufficient for their purpose at the old works. Their limits of extension were fixed by the Act of 1872, and they had been entirely occupied.

Alderman BARON stated that in the year ending March, 1866, the consumption of gas was 119 millions; in 1876, ten years afterwards, it was 241 millions, or more than double. If in another ten years only 100 millions more were required, the present works were utterly incapable of producing that quantity. During last winter they had delivered as much as 1,750,000 feet per day, whereas their maximum production was but 1,600,000 feet, and he left them to judge what would happen if there came a succession of dark days when the consumption so outstripped their production. The increase this year from March was already 5½ millions as compared with last, and if it was to continue in the same ratio during the dark months, the whole increase for the year would be from 15 to 20 millions. He did not know what the opinion of the other members of the committee might be, but he confessed he was somewhat apprehensive of the same state of things occurring again as occurred

last winter, when the town was nearly in darkness. On that occasion they were within ten minutes or a quarter of an hour of having every light in the town out. He reminded them that the Gas Committee were the only manufacturing committee that made a profit for the ratepayers, and he did not think the council, by curtailing their capital, would curtail their endeavours to make as much money as they could for the town. He urged the importance of proceeding with the new works at once, and if that were done it would be necessary to go to Parliament next session to provide the money.

Alderman WILLANS wished to know whether the committee had taken into consideration the fact that probably the requirements of the public would not exceed during the next year what they were at present, and whether, under these circumstances, it was advisable to invest a large sum of money upon additional works. He did not wish to take a gloomy view of things, but he could not help reminding the committee that the trade of the country was very much depressed, and though he might perhaps not be entitled to be considered a prophet, he might give his opinion that probably there would not be as much gas required in the coming winter as there was last. He reminded the chairman of his words a few minutes ago, that, considering the finances of the borough, no extra expenditure ought to be incurred that is not imperatively required.

The MAYOR: As I understand it, this £150,000 is to cover a large scheme, which will not be completed for many years.

Alderman SIMPSON replied in the negative, remarking that they could not put down plant to fit them for the next seven years only for less than £120,000 to £150,000. They had to expend on the old works several thousands of pounds, besides what would be needed for the extension of the retort-house and the renewal and extension of pipes. Having remarked that to have their new works ready by the time they were needed they must have their borrowing powers increased in the next session of Parliament, he went on to say, with regard to the forebodings of Alderman Willans, that during his connexion with the Gas Committee he himself had frequently had impressions of that kind. He had seen worse times than these in the state of trade—during the cotton panic, for instance—and those circumstances, one would think, must naturally put a check on the consumption of gas; but, on the contrary, there had been uninterrupted progress. There had, of course, been exceptional seasons when the increase had not been so great as at other times, but on the whole there had been an unchecked increase of consumption. There were other reasons for the increase besides the state of trade. Take the district of Wardle, for instance. Last winter it was in a most deplorable condition from the want of gas. The mains there were those which had been put in ten years ago, but since then there had been such an increase of property that several millowners had told him they had not half the quantity of gas they could use. They had now doubled the mains in that direction. In Norden they were also enlarging their mains. There was also the district of Gravel Hole, which they were supplying for the first time. There was a gradual growth going on, and he did not think the rate of increase was likely to be less, but rather greater, in the future. Taking the period from January to March of this year, and comparing it with the same period last year (which was the time when the new Factory Act came into operation), they found that the increase was at the rate of 8 per cent., but still the trade of the town could not be said to have been better this year than last. In the period from April to September, which was the summer quarter, the increase this year was after the rate of 10 per cent. He fully expected this rate of increase would go on, and they must have new plant before the end of four years or they would not be able to supply the town and neighbourhood. He was about to say, and he would say, that he did not think their extension of customers was at all complete. They had laid down at considerable expense large mains to Milnrow. Now he did not wish to say a word to injure the existing company which supplied that neighbourhood with gas, but he hoped it would be to their interest to offer the committee their plant on such terms as it would suit them to sell and the committee to buy. If they did not do that no doubt the corporation could supply Milnrow with gas with profit to themselves at a much less price than the company could supply it, and therefore he, as an individual, contemplated that the Corporation of Rochdale would supply Milnrow with gas, which would be an additional reason why they should extend their works. He did not say it out of any hostility to the company, but he had no doubt the time would come when the two concerns would be amalgamated by the swallowing up of the one by the other.

After the several committee reports had been received and discussed,

Alderman BAKER, chairman of the Finance Committee, proposed—"That the General Purposes Committee be instructed to consider the question of our borrowing powers, and call the requisite meetings in reference to an application to Parliament in the ensuing session, for extended borrowing powers to the amount of £250,000 if they so thought fit."

Mr. BOOTH seconded the motion.

Mr. SCHOFIELD was opposed to an application to Parliament next session, and, referring to the gas question, expressed a doubt as to the urgency of the need of further capital. He was by no means satisfied that the present rate of increase in the consumption of gas would be maintained. The committee had been steadily absorbing the outlying districts and providing for the wants of the people there, but that was a process that could not go on indefinitely, and having supplied all, or nearly all, the outskirts, it appeared to him that the increased consumption could not go on in anything like the same proportion as it had done in past years. He could not see any imperative necessity for doing in the next 12 months a work that could not be foreseen 12 months ago. He had no objection to the matter going before the General Purposes Committee for discussion, but he should not like it to go with the indorsement of the council that they considered it necessary to apply to Parliament next year.

Mr. TOMLINSON said if the council refused to go to Parliament next year they must take the responsibility of driving the Gas Committee up into the corner, as regarded the supply, in which they had been once before, but did not wish to be again. It was clear to his mind, from the figures given, that in 1879 they would need an extended production from some source or other, and it had been estimated that if they commenced on the new land next day it would be three years before a single foot of gas could be produced from the works erected there. Those questions had been well considered by the committee, and he assured them they were not asking for anything more than was absolutely necessary.

The MAYOR remarked that the question under discussion involved a number of considerations which could perhaps be best discussed between the committees. There would be the question as to the probable cost of the land, then whether, looking at the present rate of consumption, the extension could be put off for another twelve months, and also the question of refusing to take on new customers. He was in favour of a conference between the committees. There were strong reasons why the council should not go to Parliament this year if it could be avoided, but whether it could be avoided was a question deserving of very careful consideration.

Mr. BOOTH suggested a committee of the whole council to consider the matter.

Alderman WILLANS thought it was desirable the question should not be referred to the General Purposes Committee without some expression of opinion from the council on the general principle. For his own part he failed to see that any valid argument had been adduced which would warrant the council in entertaining favourably that great expenditure on the part of the Gas Committee, except as regarded the question of obtaining land, but with reference to that he thought the land ought to be secured, as it seemed a matter of ultimate necessity.

Alderman BARON, in reply, said the data supplied by the past justified the Gas Committee in reckoning upon an annual increased consumption of 10 per cent., and at that rate it was positively and absolutely certain that the present works would, at their utmost capacity, be inadequate to the supply of the town in the course of three or four years. These were facts, and if they were not to argue from the data supplied by the past, what were they to argue from? There was no reason why the increased consumption which had been going on for years past should not continue. The population was increasing, houses were being multiplied, and if they did not supply gas to those who wanted it, what would be the result? They would make it for themselves. Bluepits, for instance, would very soon make their own gas if the corporation did not meet their requirements. He could not understand such parsimony. In order that the council might understand the position of the committee, he mentioned that on one occasion last year all the holders were at the bottom but one, and in that there was only one plate visible above the surface of the water.

The motion was then put and carried by a majority of 19 to 3.

SHEFFIELD WATER-WORKS COMPANY.

PROPOSED PURCHASE OF THE UNDERTAKING BY THE CORPORATION.

At the Meeting of the Town Council of Sheffield on Wednesday last, the 11th inst.—the MAYOR (Alderman Tasker) in the chair,

Mr. MAPPIN moved the appointment of a committee to endeavour to negotiate with the directors of the Sheffield Water-Works Company for the purchase of their works and undertakings. In doing so he said it was well known that the town, for some years past, had expressed its desire to obtain possession of the water-works from the company. Several attempts had been made by the council to carry this into effect, the results of which were also well known. It was not necessary then to inquire as to the cause of those failures; but he thought every member of the council would agree with him that it was very desirable for the authorities of all large towns to be possessed of the water supply to the inhabitants. Another consideration that induced him to bring this motion before the council was the financial position of the water company. They had been for some years gradually descending deeper and deeper into difficulties, and he believed that now was a proper time for the council to take action, and see if they would not be met with a different spirit from what they had been on any previous occasion. He found from the accounts published by the company that in the year ending Dec. 31, 1867, they had expended £876,223. From that time to the end of 1875 they had expended £702,029, nearly as much more, making altogether £1,578,252, which they had expended on capital account. This had entailed a heavy burden upon them, and the interest paid upon their debentures and preference shares had rapidly increased. At the end of 1868 they paid for interest on debentures and preference stock £22,378, and in the year 1875 they paid £51,551, more than double—very nearly two and a half times. The increase in these seven years was £29,173. Their position in the year 1868 was something like this: They paid on debentures and preference shares £22,378, and they paid a dividend on ordinary shares of 3 per cent., equalling £13,500. The cost of management at the same time was £8557, making a total of £44,435, and their total income that year was £42,621. They paid away more than they received by £1814. Referring now to the last year—the year 1875—it would be seen that they paid as interest on debenture and preference shares £51,551. They paid a dividend on their ordinary stock of 4 per cent.—not 3, as they used to do—£18,237. The cost of management that year was £13,005, making a total expenditure of £82,793; and their total income that year from every source was £61,888, so that they paid more than they earned by £20,905. They had had some little difficulty to manage this state of things, and to help them out of it they obtained a decree in Chancery by a friendly suit, that enabled them to pay the interest upon unproductive capital and charge it to capital. The total sum was £70,345 that they had paid away in dividends and charged to their capital account, besides taking from their surplus fund, which had accumulated during many years past, £11,358. So they required £81,713 to enable them to pay the dividends they had done, which they took out of their capital and reserve-fund. That was up to the end of 1875. Their reserve-fund at the end of 1875 stood at £1729. But they were not satisfied with their decree to pay a dividend upon their ordinary stock of 3 per cent. as it used to be, and they increased the dividend upon the open stock to 4 per cent. He never heard a reason why they did this, but what had been the result? They had not earned, during the year 1875, sufficient to pay interest on their debentures and guaranteed stock. So that at the present time they were absolutely in the position that there was nothing for their open stock as dividend, unless they continued the suicidal policy of taking from capital to enable them to carry out what they had done so long. To help them to do this, they had adopted another plan. They created 18,000 E shares of £10 each, upon which they made a call of £2 per share. This enabled them to exercise their borrowing powers. After they had exhausted these borrowing powers, they created 20,000 F shares of £7 each, but they only called up £1 per share. They then exercised the remainder of their borrowing powers. Having done this, their only chance was to raise further money—to call up their E and F shares. Now he considered that if ever the council were to become possessed of the undertaking of the company, it was very undesirable that they should call up these shares. If they did, they would call them up and guarantee to pay upon them 5½ per cent. for ten years, whereas if the town required this amount of money they could borrow it at 4 per cent. without any difficulty. It was a very important consideration that they should, if possible, arrange with the corporation before they put a heavier debt upon the concern. There was another great advantage. The company possessed very fine water-works, capable of supplying a town twice the size of Sheffield for many years to come. These works were practically completed, and if the corporation possessed them there would be no difficulty in avoiding the expenditure of further money, at all events to any extent, upon the capital account, but the company themselves were in a different position. There were Acts of Parliament which had imposed certain duties upon them. The Yewden Valley scheme had to be carried out. He believed they had purchased most of the land there, but they had not commenced the works. Therefore they must have some capital, or some powers to postpone the completion of this work, given to them by Parliament. There was another matter which had caused him to decide at once to act upon the figures that he had collected—that was the resignation of the chairman and two of his colleagues at the board. In his opinion that was a step the importance of which could not be over estimated. That a man like the chairman of the water company, possessing, he was told, preference shares and open stock to the extent of £150,000, should give up the power that he had as chairman of the company—should resign his seat at the board, and leave the management of the large property which he held, to his opponents; or, at all events, in the hands of gentlemen with whom he differed—that was an act which he could not contemplate any man, capable of judging what he did, would do without very much consideration. And this, coupled with the fact that the chairman's resignation was followed by that of two other directors, showed him that there existed at the time of the resignations a great difference of opinion, upon some subjects, amongst the directors of the company. He thought, considering the financial position of the company, and considering, too, the disorganization which existed, they should, as reasonable and business men, see what was the best for the shareholders under the circumstances. He had not inquired, but it appeared to him that the four directors who remained did not form a quorum. He had taken no legal opinion on the matter; but he believed that four were not a quorum, and that one could not be formed unless there were five directors. He would now refer somewhat to himself in the matter. He would tell them candidly the interest he had in the company. He possessed £3000 of 4 per cent. preference stock, £3475 of E shares at 5 per cent., and £1296 in C shares, which would bear 5½ per cent. interest for a year or so, and then 5 per cent. Therefore, so far as these shares were concerned,

any action of his, or any course pursued by the council, could not have any effect upon the value of them. Then he possessed £100 worth of E stock and £70 of F stock, upon which the company paid 6½ per cent., and he also possessed £250 worth of open stock. The open stock was the principal portion that would be effected by any course the council might think fit to take. After he left the board of directors, he sold all his open shares except £250 worth, and he retained that amount merely to give him an opportunity of going to the company's meetings, and of saying anything he desired. Again, if the action of the directors as to the paying of interest out of capital was changed, the E and F shares would be seriously jeopardized; and therefore he took it that if the council, by any committee they might appoint, were unable to agree upon terms to become possessed of the undertaking, the open shareholders and the guaranteed shareholders would, for their own protection, take some action in the matter to prevent the directors from paying upon the open stock out of capital. He had no object whatever in what he was doing, so far as his own interest was concerned, as he held but £250 worth of open stock and £170 of guaranteed stock. That was the only interest he held in the company that might be affected by any proceedings of the board of directors or the council. In bringing his motion before the council, he had adopted a course which he, as a citizen and a member of the council, considered was the best. He had had many opportunities of judging of the action of the directors of the water company. He was a member of the board for a good many years amongst a number of much older colleagues. He was elected as a young man, and their opinions and his own did not agree on very many occasions. He, for instance, was appointed, with the late chairman, on the day of the accident to the Dale Dyke, to visit the scene of the accident, and report to a second meeting of the board the same day what they had seen. He did so, and, in the course of a few days, some action was decided upon. The board appointed one firm of valuers in the town to act for them, and he told the board that he thought they were not acting for the interests of the company, and that they should employ every respectable valuer in the town at once to go and see what claims were made against the company, and to have them taken down in writing. If they had done that, which they did not, they would have had a very different result from the accident. Shortly afterwards he had cause to resign his position at the board, but he was prevailed on by several large shareholders to return on certain conditions, and he remained a member of the board until 1869. During that time he repeatedly urged his colleagues to come to some arrangement with the town, and more especially in the year when Mr. Webster was mayor. It appeared to him at that time that the council and the company were on much better terms than they had been before But that year a proposal was made by the company that the corporation should put down stand-pipes in certain parts of the town, at an expense to the corporation of £1200. This naturally very much annoyed the members of the council, and great ill-feeling was the result, which he quite expected; because the proposition made at the time by Mr. Jackson, the chief constable, was such a reasonable one that he felt the directors should have acceded to it. Then the "rules and regulations" were proposed by the directors, and they came before two of the local magistrates, the late Mr. Dunn and Mr. Jobson Smith. After several days contention respecting them, in the course of which great feeling was displayed, a meeting of the directors was called, and at that meeting a proposition was made that the company should go to Parliament for an Act to pass the rules and regulations. That was done without any previous warning to himself and others. They knew nothing about it. However, it was proposed and seconded that the company should go to Parliament to pass the rules and regulations, inasmuch as it appeared very likely that the magistrates would not grant them. He protested in every way he could against the resolution, and he felt it very strongly that the directors should be asked by the chairman and others, who had the arrangement of the matter, to decide upon so important a question in half an hour's time, and he proposed an amendment that they should await the result of the decision of the magistrates. He got no seconder, however, and that was the last time he sat at the board. The rules and regulations were passed by the local magistrates, and, so far as he could learn from the feeling of the board, the decision of the magistrates exceeded their expectations. The company then withdrew their bill and paid the expenses. He had now told the council a little of his connexion with the company; and it was unnecessary that he should say further that he really had no selfish interest in bringing the motion before them. But at the same time he did not think it would be right for him to vote upon his motion, and in fact he did not intend to vote upon it. He certainly regretted that he had to bring so important a matter before the town at this period of the municipal year, because it might create a difficulty at the elections which were so soon to take place. However, he considered that no reasonable man could object to have the water supply of the town in the hands of the local authorities, upon one condition, and that condition was a very important one—it was that the council should pay the value of the works, and no more. If they passed the motion which he now proposed, and he was a member of the committee, the council might depend upon it that he would not support the view of any man to pay more than he thought the concern was worth. He had had opportunities of judging of the value, and he had thought over a scheme for the purchase of it, which he believed the town would have reason to be satisfied with if it was carried into effect. This, however, was not the proper time to talk about price, and, therefore, the council would excuse him if he did not now say what his scheme was. But they might rest assured that the gentlemen whom he had named on the committee would not, if he had anything to do with the negotiations, consent to give anything more than the town ought to give for the company's works and undertaking. By-and-by the council would be in a position to discuss the question thoroughly, and then to say either "Yes" or "No." If they did not like the price, do not let them purchase the works. There were many advantages in the town having the water-works in their own possession, and, therefore, the only question for the corporation to consider was that of price. No reasonable man could entertain a doubt that the corporation ought to possess the command of the water supply; and the simple question for the corporation was to see that they did not overburden the ratepayers, especially at this time.

Alderman ALLOTT seconded the motion, remarking that he had on former occasions explained what the position of the water company was, and also endeavoured to make some forecast as to what it would be in the future. It so happened that since the time of which he spoke, nearly four years had elapsed, and the anticipation with regard to the question of capital and to the increase of revenue had been realized. With regard to the question of capital, the amount which was estimated as likely to be required in order to complete the two reservoirs in course of construction was much below the amount charged to capital in respect of them. With regard to the income, it had increased at the rate of something over £3000 annually; but the circumstances which Mr. Mappin had related with regard to the increase of the company's capital had been such that the position of the water company, financially, was much worse than it was then. He wished just for a moment to take the council back to 1864, when the water company, after the calamity in March of that year, applied to Parliament for power to raise money to enable them to pay the damages which that disaster caused, and also to obtain some compensation by way of increasing the rates for the loss thrown upon them. The council would remember that the company obtained the power to increase their rates to the extent of 25 per cent. It now appeared that the expenditure under that Act, in the nature of compensation for damages, and the expenses caused by the flood, reached something like £365,000. Since 1872, the accounts which had been published did not state, under the heads of the various Acts under which the expenditure was authorised, how that expenditure had occurred, and they could only say what was the amount expended under the Act up to the end of 1873, which then amounted to £364,700. Mr. Mappin had referred to an order in Chancery by which the company were enabled to charge interest upon unproductive works and works in course of construction on capital, and he had stated to them that the amount charged up to the 31st of December, 1875, was upwards of £70,000, and that, added to the £365,000, made a total which had no representative in any property of any kind whatever of £435,000. He had explained to the council once before that the order from the Court of Chancery was, he thought, of a very peculiar character; because it went to justify a charge of outlay on works in construction, and it also justified the charging of the interest on works which were completed, and not utilized until they were completed. The result was that with regard to the capital employed in the construction of the Strines reservoir, the interest was charged to capital for a considerable time after that reservoir was finished. The two reservoirs now finished—the Dale Dyke and the Damflask reservoirs—were neither of them utilized, and so long as the company could keep them unutilized, according to the order referred to, they were entitled to charge interest on their cost to capital. And it stated that there was a supply, provided the Damflask reservoir was full—but it was not; the water was running through it—but providing it was full there would be a supply of water equal to double the requirements of the present population. Therefore, assuming this order to be carried out, it was to the interest of the water company and the open shareholders to allow this interest on the cost of the reservoir to be charged to capital for an indefinite period. Power had been obtained from Parliament to construct another reservoir in the place of the one destroyed. The entire cost of that reservoir had also gone to capital, so that the capital account of the company represented the loss upon the Bradfield reservoir, and the cost of the new reservoir (the Dale Dyke) to supply its place, as well as the £70,000 of interest on capital account. The effect of this operation was this, that any principle in value by which property was transferred must necessarily be based on the value of that property; and if the principle enunciated by the hydraulic engineers of the country, and repeated so recently as 1872 by Mr. Hawksley, that one million gallons of water daily represented an outlay of £120,000; 10 millions of gallons of water daily represented an outlay of £1,200,000; and upon that showing there was nothing whatever left for the £382,000, which the capital expenditure of the water company showed. With regard to the unpleasant position of the company, and the risk of the chairman and directors, he thought it right to say that the chairman was elected as a director and chairman after the retirement of Mr. Cockayne in 1873, and he succeeded to his position after the order in Chancery had been obtained. Consequently he presumed that the chairman was bound to the action taken by his predecessors. The same thing applied to Mr. Bardwell, who was elected in 1874 on the death of Mr. Waterfall. Mr. Unwin was elected previous to the order being obtained. Mr. Mappin had shown that the increase of the debt to the company was against the interest of the town. It was against the interest of the town in this way—that if a demand were made for the payment of any portion of it, then it would be against the town, but if they paid a fair and equitable value for the property of the company, he did not see how the town would suffer by the increase of their debt. Mr. Mappin had shown them what the deficiency of the revenue to meet the debenture and preference interests for 1875 was; but for 1873, 1874, and 1875 there had been a deficiency altogether amounting to £6600, and notwithstanding that, the directors had divided amongst the ordinary shareholders 4 per cent., instead of 3 per cent., as was paid previous to 1873; the effect of the whole operation being, that the total dividend, within £1600, which had been paid on the ordinary shareholders during the last four years had been paid out of capital.

Alderman FAIRBURN doubted whether, after the ill-success attending past efforts of the corporation to obtain the works, it was right even to wish to possess the property. If the company desired to dispose of their undertaking, they could signify their intention to the corporation, and then he would be one of the first to treat for it upon fair and equitable terms. But he did not think the course now recommended was a dignified one, after the treatment they had received.

Alderman HARVEY, notwithstanding the imposing array of figures laid before the council, would not vote for the motion. They could all see what position the water company were in, and what position the corporation would have been in if they had obtained the water-works some years ago. He had been a little bit surprised at the proposal to appoint a committee, because he did not believe they would have water any cheaper, neither did he think the town would be better supplied with water than it had been hitherto if the council purchased the works. He had always been an advocate of the purchase of the works, but at their market value. He wished to point out that the company had not notified to Mr. Mappin that they had had any intention to sell their works, and the proposition seemed to have been brought before the council without any father to it. Mr. Mappin certainly had shown great feeling towards the town; but he had shown a little bit of feeling towards those big shareholders in speaking of their position. Now, what the council had to to do, as stewards of the town, was to deal honestly and straightforwardly with public funds. The district-rate had been increased that morning, and the poor-rate had been increased. The sanitary question must come before them before very long, and even if they got the water-works on advantageous terms, it would cause them to spend a great deal of money, and they would not get water any cheaper, nor would they have any better supply. As for the works of the company being finished, the council, if they took to them, would find themselves in such a fix as they had never been in in their lives. It was all very nice to talk about the water flowing into their baths, and so on; but if they allowed that, they must know that they would be taking away their present income to some extent, because if they gave that flowing of water for nothing it must affect the revenue. Every stratagem had been resorted to by the company in respect to plumbing and other businesses, and if the council took over the whole concern on a liberal principle, they would be burning the candle at both ends, to some extent. He sympathized with the disagreement amongst the company, but felt it would be ungentlemanly on the part of the council to intrude themselves into the board-room just now. He thought it would be much better to defer the question until the company had come down into a quiet and temperate body, when the council, if they decided to purchase the works, would meet with a proper and courteous reception.

Alderman BEAL did not think there would be any harm in the appointment of a deputation. It must be remembered that now the works were finished the water company's outlay would not be so heavy. He thought, in valuing the works, allowances should be made for the misspent and useless amount of capital that had been laid out. They must fairly consider all sides of the question before anything definite was decided upon.

Alderman FIETH said he should advise the council to wait in this matter. They would lose nothing by doing so, and if they consulted the interests of the town they would wait a little longer. He did not say that it was not desirable to have possession of the water company's works, but he did not think the present was the time for doing it. He believed they would lose nothing, but rather gain, by waiting.

Mr. FOSTER said it had long ago been accepted as a sound principle that undertakings for the supply of water to towns should be under the control of the municipal authorities. The application of that principle to any particular case was, however, more or less urgent according to the circumstances of the place. In many instances the purchase of the water-works by the corporations had been with a view principally to the necessity of improving the water supply. It had sometimes happened that financial considerations had been favourable, inasmuch

as corporations had the means of raising funds for the purpose at a lower rate of interest than was generally considered satisfactory by members of trading companies. Neither of these advantages applied with any great force to the present case. The sanitary consideration was weakened by the fact that the town already had an abundant supply of water obtained by Act of Parliament. And, therefore, the sanitary part of the case amounted to little more than this—that if the water-works were under the control of the corporation instead of in the hands of the company, they might in times of great abundance of water use the superabundance for the flushing of the sewers and for other sanitary purposes. He was not now saying that that was not a most important advantage, but he ought to point out that that advantage fell very far short of, and was very different from, a case of necessity to improve the supply for domestic purposes. The financial advantages were affected in just the same way. The works were constructed, and a large amount of capital to the extent of £650,000 had been raised as a permanent first charge upon the revenues of the company. Of that sum £4500 was a debenture debt, upon which he supposed the company were paying 4 per cent. Therefore, very little margin would be left to the corporation if they acquired the property, inasmuch as they would not have to lay out money for extensions, and thus there would be little money for them to borrow to feel the advantage of borrowing at a lower rate of interest than was possible to trading companies. It appeared to him, therefore, that the case for acquiring the works was not nearly so strong, whether from a sanitary point of view or a financial point of view, now as it was some time back, when the supply for domestic purposes was limited. Therefore, whatever it was that rendered it desirable that they should approach the water company on the present occasion, there certainly, to his mind, was not any urgent necessity on the part of the council. They were all aware of a charge of £70,000 to capital. They were all aware of the dividends having for some time been paid entirely out of the capital, and if the charge to capital for interest were to cease, they were also aware that no dividends whatever could for the present be paid to the holders of open stock. The interest of the holders of open stock in the company was entirely prospective and contingent upon the good trade and growth of the town, and in 1890 they were likely to get the company's rates reduced one-fourth. If for a prospective uncertainty they were to give the company a present certainty, it seemed to him they could only approach the question in a business way. They must discuss it as business men, and if they made the purchase they should do so on terms which would give them a fair equivalent. That was his view of the case, but at the same time he could see no harm in the appointment of a committee. He should not like at any future time to feel that an opportunity had been lost, because he believed in the correctness and soundness of the principle that all such undertakings ought to be, if they could be acquired on fair terms, under the control of corporations. Therefore, without being at all sanguine as to the result, he should vote for the appointment of a committee, and he did so simply on the ground that he should not like at any future time to know that an opportunity had been missed of arriving at a fair adjustment of the question. If the committee succeeded in obtaining from the directors an idea of the price which they put upon their property, he should be very glad to give it fair consideration, and he should be prepared then to state what his views were as to the value of the property. But at present he thought that was a topic which it was better to avoid. He should content himself, therefore, with the expression of his opinion generally, and the giving of his reason why he should vote for the appointment of a committee.

Mr. CLEGG said it appeared to him that, in discussing the question, a great change had come over the opinions of some of the members. Somewhere about four years ago a great majority of the council were wild upon the question of obtaining possession of the water-works. He did not know of any difference in the state of affairs with reference to the company or their charges, between that time and the present. The company had never been to Parliament to obtain any Act to enable them to alter their position with reference to the corporation and themselves. They knew four years ago that the 25 per cent., put on in 1864, would come off in 1890, and they knew that the price they had to pay for water was the same then as now. Yet they endeavoured at that time, by all the means in their power, to get possession of the works. The council might have been in the dark, but they certainly talked enough about the matter to let light into it.

Mr. AITCHISON said he agreed that the supply of water should be in the hands of the governing body, but he thought the motion to appoint a committee to negotiate with the company was premature until they knew something of what the company proposed to do.

The discussion was continued for some time, and much warmth was excited with reference to some of the names proposed for the committee. Ultimately, the motion, amended by the substitution of two or three fresh names, was put and carried unanimously.

RIVAL GAS COMPANIES.

[From the *Huddersfield Weekly News.*]

Milnsbridge is happy, or ought to be, in the possession of two companies having works and plant for the purpose of supplying its householders with that most useful and necessary commodity—gas. There is an old gas company and a new gas company. The former has a history—the latter will have one, for in its infancy it has shown a precocity which completely throws its rival into the shade. Gas is gas, by whomsoever made and retailed; but Milnsbridge people have a notion that there is gas *and* gas. They have lately grown fastidious as to the manner of supply, and the result has been the formation of a company mainly composed of millowners in the district, resolved upon dispensing with the gas from the Longwood Gas Company, so notorious in the annals of municipal legislation at Huddersfield, and which exists under the all-sheltering wing of an Act of Parliament. The new company commenced operations about eighteen months ago, and obtained a site nearly contiguous to the Longwood (and Milnsbridge) Gas Company, the railway being the "line of demarcation." It was not considered necessary to obtain a parliamentary charter to float the new venture, and the company noised it abroad that any ratepayer or millowner could have service-pipes laid to his house or premises to convey the much-prized carburetted hydrogen for illumination. Permission to this end was obtained from several of the local boards of the adjoining districts, and everything went on swimmingly until a few weeks ago, when the cloven foot made its appearance. Some of the millowners who had hitherto used gas from the old company intimated their intention of discontinuing it, and requested that it might be cut off. New mains had already been laid by the new company, so that when the plant was erected and the large gasholders sufficiently inflated, it might be turned on. A considerable number of intending users of "new" gas have premises on the opposite side of that famous trout-stream, the Colne, and before the gas could be sent through the service-pipes, it was necessary to lay one joint-pipe to connect the pipes already laid on each side of the bridge. The pipe required to be laid opposite Bottom Hall Mills. On Wednesday, the 4th inst., this pipe was put in by some workmen employed by the new company, and gas was turned on for the first time. However, a number of workmen employed by the old company turned up the earthwork, in a spirit of retaliation for depredations said to have been committed by men of the new company, and smashed the newly-laid joint-pipe. A number of mills were consequently in gloom on Thursday morning, and in darkness after sunset on the same night. A raid upon the goods of the tallow-chandler was the result. The men of the new company were instructed to take time by the forelock, and to arouse themselves from their slumbers at an earlier hour than usual on Friday morning to replace the broken pipe. The men of the old company got scent of what was to be enacted, and determined to be spectators, if nothing more, of the skill of their rivals. Long before daylight both bodies of men were at the scene of disaster, and probably shook hands before the tussle commenced. The "new" men commenced vigorously to turn up the earth in order to carry out their instructions, and the "old" men stood quietly looking on, exchanging only an occasional "cutter." By-and-bye the energies of the "new" men became exhausted, and they rested upon their picks and spades. This was the opportunity which the "old" men had expected, so they availed themselves of it. They commenced to shovel the earth into the hole from whence it had just been thrown, and the "new" men exercised the discretion which is said to be the better part of valour. They, in turn, stood meekly by, though the "mercury" was rising. The cavity was soon filled, and the "old" men made way for the "new," who again commenced the work of excavation. Thus matters went on, and in the meantime Police-sergeant Stansfield was sent for. He arrived shortly before five o'clock, and seeing the possibility of a serious *mêlée*, communicated with Police-sergeant Ramsden. No alteration in the tide of events took place; one party of workmen turned the earth up, and the other pitched it in again. There were about twelve men of the new company to six of the old, and of course the six could well compete with the twelve under the circumstances—the "new" men being in the hole and the "old" men at the top. Towards half-past five or six o'clock workpeople began to pass, and were so interested and amused at the extraordinary proceedings that a crowd was soon collected. To earlier arrivals on the spot the fun was immense; but as the crowd increased jeers and hard-hitting words were bandied about in perhaps a little less appreciable and less agreeable fashion. The police sent off telegrams to Huddersfield and to all parts of the neighbourhood—even to Holmfirth. Superintendent Sykes, with a *posse* of men, was upon the spot in a comparatively short time, bringing with him officers of the borough (Huddersfield) as well as the county constabulary. Superintendent Hilton also put in an appearance, and the men were told off ready for duty in case of emergency. In the meantime the crowd had increased to about 2000 people, and the most lively excitement prevailed. Several mills were stopped, and the workpeople ranged themselves on sides according to their individual interests in the two gas concerns, or according to the interests of their masters. Word tournaments were carried on in every quarter and centre of the multitude; but the two bodies of men worked nobly on. About eight o'clock, a quantity of bread and cheese from a neighbouring hostelry was brought to strengthen the nerves of the "new" men, and this was the signal for the fight—in the double sense. The "old" men also made a rush for the good things provided for the "new" men. In a few moments bread as well as cheese was seen flying in the air, pots were smashed, the multitude waved to and fro, shouts were set up, the respective war-cries uttered, and the battle began. Shouting and brawling, kicking, running, calling for police—and it was all over. The police were equal to the occasion, and soon struck terror in the hearts of the would-be rioters. The joint-pipe was afterwards put in, the earth rammed tightly down, and last night the gas of the new company shone defiance to the gas of the old.

IRON AND COAL TRADES OF SHEFFIELD, SOUTH YORKSHIRE, AND NORTH DERBYSHIRE.

(FROM OUR OWN CORRESPONDENT.)

There is now an evident improvement in the condition of the iron trades of this town and vicinity, although the alteration therein is still by no means so strongly marked as that which characterizes some of the lighter industries. In pig iron, there is a firmer tone observable, numerous lots having changed hands within the past few days at rates which are, on the average, a shilling or so higher than those ruling a week or ten days ago. Something like three-fourths of the total number of local furnaces are in blast, but not a tenth part of the aggregate output comes into this market. At most of the larger South Yorkshire and Derbyshire iron-works, a very large proportion of the production of pig iron is used upon the premises, the balance being disposed of on contracts to Staffordshire or local firms. I hear that one leading North Derbyshire house is pretty well sold forward at its present rate of production, although any further demand could easily be met by re-starting the two furnaces at present, and for some time past, out of blast.

It had been expected that the Wolverhampton quarterly meeting would have brought about some augmentation in finished iron quotations, but that expectation has not been realized, and the makers hereabouts must perforce follow suit. The foundries are irregularly engaged. In this town, those establishments are not busy, except upon builders castings, ornamental ironwork, stove-grates, and miscellaneous small articles; whilst at the larger places in the outskirts there is a steady business doing in pipes for gas, water, steam, and other purposes, as well as in colliery castings of large size.

The coal markets are hardly up to the average of this season of the year, the weather so far having been very mild. In consequence of this, the attempts of some of the coalowners to obtain advanced prices have been rendered nearly futile, and further efforts in the same direction are hardly likely to be made, until severe weather sets in. Steam coal shipments to the Baltic and certain northern ports are being hurried on with all possible expedition, as the Baltic may now be expected to close within about three weeks or a month hence. The Hull Dock Board have greatly incensed the Yorkshire coalowners by giving notice that they will not allow any coal waggon to be unloaded at those docks, except such as have what are known as "hopper" bottoms, which are wholly exceptional, and not required elsewhere.

THE LANCASHIRE COAL AND IRON TRADES.

(FROM OUR OWN CORRESPONDENT.)

There has not been so much pressure for best coal during the past week, consequent upon the warmer weather, and colliery proprietors are not, as a rule, able to obtain advances upon last month's prices. They are, however, generally very firm at late rates, as better prices are anticipated as soon as the winter sets in; and as stocks are not heavy, any considerable increase in the demand would no doubt soon make itself felt in the market. The first and second qualities of common coal which can be used for kitchen purposes are in more demand, but the inferior classes for forge and steam purposes are still a drug and low in price. In gas coal there is not much change to notice since last week. Burgy is offering more freely in the market than it was, and slack is becoming plentiful with an easier tone in values, colliery proprietors in some quarters pushing sales at rather lower prices in order to get rid of their supplies. The average pit prices in the Wigan district may be given about as under:—Good Arley, 10s. to 11s. per ton; Pemberton four-feet, 9s.; screened gas coal, 8s. to 9s.; first and second qualities common coal, 7s. 6d. to 8s. 3d; forge coal, 6s. 6d. to 7s.; burgy, 5s. 6d. to 6s.; and slack, 3s. 6d. to 4s. 6d. per ton.

In the shipping trade there is very little material change to notice. The slight improvement which was perceptible a week or two back has scarcely been maintained, and business is generally dull. Very few cargoes for export are being sold, and what little is doing is chiefly in best coal and gas coal for the home trade.

There has been some speculative buying in iron in this district, and prices are stiffer, but the legitimate demand from consumers is still only small, and there is not as yet any indication of a permanent or general improvement in trade. For local makes of pig iron, quotations remain at 56s. to 57s. per ton for No. 3 foundry, and 55s. per ton for No. 4 forge, delivered into the Manchester district, but there is no disposition to push private sales at these prices. For north country iron offering in this district more money is being asked—No. 3 Middlesbrough foundry delivered being quoted at 54s. 9d. to 55s. 9d. per ton, and No. 4 forge at 52s. 9d. per ton. There is a better feeling in the finished iron trade; more inquiries are reported, and some of the Lancashire forge proprietors

have secured a fair amount of work for the present. There is rather an upward tendency in prices, and ordinary Lancashire bars delivered into the Manchester district are quoted at £6 17s. 6d. to £7 per ton.

THE COAL AND GENERAL TRADE OF THE NORTH OF ENGLAND.

(FROM OUR OWN CORRESPONDENT.)

A similar report has to be made this week as last. The gas coal trade of the Tyne, especially in the demand for the better qualities, has now become very active. Gas-works which have contracts running over the year, and have held back, are now pushing for their completion. There is a rush at the shipping places. All the best collieries are full of work, and some have turns extending from a fortnight to three weeks. The inquiry for medium qualities of gas coal also improves, and shipments coastwise, and to the nearer ports of Europe, will be heavy during the whole of October. The other sorts of coal are in very fair demand. The position of best steam is well supported in the market, and household coals are coming more into request. Small coals, which are taken off very rapidly when the iron factories are in full work, are now, however, a very heavy burden upon the pits. There are great heaps of small coals at the Northumberland collieries unmarketable. Last week a heap of 60,000 tons took fire, and will be entirely destroyed.

The coasting freight market was decidedly firmer last week. Orders were more abundant on Newcastle Quayside, and there were more merchants than shipmasters looking after engagements. There was an advance all round of something like 6d. per ton upon coasting freights, and handy little vessels were needed on Saturday to take up orders which remained in the market. Steamers were paid from 5s. to 5s. 3d. per ton to London, and 6d. per ton more to Rochester; Dublin, 8s. 3d. Continental rates were from £7 to £7 10s. per keel. Outward business to the Mediterranean is poor; but the homeward business has greatly improved; and under these circumstances, it is in every way probable the freight market, during October, will have a slight tendency upwards on all kinds of coasting business.

The Cleveland iron trade seems to have established the little improvement noted last week, and to all appearance has now touched its lowest point, and may be expected to gradually work up to more remunerative prices. The houses which, by underselling, did so much mischief to the trade, seem all to have collapsed; and the market having been weeded of this sort of business, substantial manufacturers can stand out for better prices. The chemical trade of the North of England is likewise better. There was a rise of 3 or 4 per cent. in prices last week; and as the demand from the United States of America is supported. Trade in Liverpool is better in consequence, so there seems a prospect that prices in the North of England will continue to have a hardening tendency.

Fire-clay goods, cement, and other material generally used about the gas-works, are being shipped in rather larger quantities; but this possibly arises from the near approach of winter and stormy weather, rather than from any extraordinary demand for those goods.

TRADE NOTES FROM SCOTLAND.

(FROM OUR OWN CORRESPONDENT.)

At the present time most of the burghs throughout Scotland are in a state of greater or less ferment, in connexion with the forthcoming election of members to the various Town Councils, and the candidates for election, as also those who are simply giving an account of their stewardship, are being called upon to say something regarding the various subjects embraced in the local politics. The gas question is very frequently one of those, and in connexion with the municipal movement in Glasgow one of the town councillors, who has completed his legal term of three years, has, during the past week, made a very agreeable announcementupon it. Councillor Finlay, the gentleman referred to, in addressing his constituents the other evening, alluded to the action which he had taken as a member of the Gas Commission, remarking that in 18 months the debt of £14,377 was paid up, and that the commission was left with £23,293 in hand. The price of gas, too, had been greatly reduced, and he believed that it would very soon be further reduced to 3s. 9d. per 1000 cubic feet; indeed, the commission were at present in a position to make such a reduction, were it not that they were now, and had been for a long time, engaged in the replacing of branch gas-pipes in the public streets.

In his report on the quality of the Glasgow gas for the week ending the 7th of October, Dr. Wallace shows that in no case was the minimum illuminating power under 25·26 standard candles, while the maximum at the Tradeston station was 28·50 candles, and that of the Partick gas was up at 29·16 candles. The average illuminating power ranged from 25·96 candles at the Dalmarnock station to 27·83 at the Tradeston works. There were 13·29 grains of sulphur per 100 cubic feet in the Dalmarnock gas, and 0·20 grain of ammonia.

At last week's meeting of the Town Council of Edinburgh it was reported that on the 6th inst. the gas supplied by the Edinburgh Gaslight Company had an illuminating power of 32·46 candles, while that of the Edinburgh and Leith Company was equal to 29·21 standard candles.

The Town Council of Leith met last week. One of the items of business under consideration was a proposal to purchase a photometer (an Edinburgh paper calls it a *phonometer*) for the purpose of testing the gas used in the public lamps. The proposal was remitted to the Lighting Committee, with powers.

It was reported to the Police Commissioners of Arbroath, at their ordinary meeting last week, that there are at present in the burgh 427 public lamps, which, with the harbour lamps, gives one lamp to every 87 of the inhabitants. The Lighting Committee recommended that a number of additional lamps and regulators be procured, which was agreed to by the commissioners.

The Police Commissioners of Johnstone, at their meeting last Monday evening, resolved to take into consideration the advisability of taking advantage of Sir Windham Anstruther's Burghs Gas Supply (Scotland) Act. Provost Shanks, who presided, drew attention to the enormous amount charged by the gas company for the street-lamps. Last year £315 1s. 1d. had been expended on gas, of which £190 16s. 10½d. had been paid to the gas company for consumpt. They had 180 lamps in the burgh, the cost of which last year, on an average, was fully one guinea. He considered the sum exorbitant, and referred to Dunoon' where the authorities paid 13s. per lamp. The commissioners agreed to bring the matter under the notice of the gas company, with the view of procuring a reduced rate for the future.

I ought to have mentioned before this time that a special meeting of the Police Commissionors of Inverness was recently held, for the purpose of receiving the report of a special committee as to the appointment of a manager for the gas and water works. Thirty-two applications had been sent in, most of them from mechanics, foremen of gas-works, and meter inspectors. Several proposals were laid before the meeting, and eventually that submitted by the Provost was carried—namely, that Mr. James Thomson, of Edinburgh, be appointed manager of the gas-works at a salary of £150 per annum, with free house, coal, and gas; and that Mr. Ewen Macdonald, Inverness, be appointed manager of the water-works at a salary of £120, with water and gas. The meeting afterwards sanctioned the application for a further advance of £10,000 from the Public Works Loan Commissioners, for the new water-works. Mr. William Stiven, the late manager of the gas and water-works of Inverness, was recently presented by the persons who had been employed under him with a handsome silver salver and tea-service, in recognition of their good will, esteem, and regard for him personally during their long business connexion together.

A bill is to be brought into Parliament during the ensuing session by the Glasgow Corporation Water Commissioners. The preamble of the bill sets forth that, in consequence of the great increase of the trade and population, it has become necessary to construct additional works and conveniences to afford an increased supply of water, and to provide for efficient distribution; and that for the general purposes of their undertaking, and to enable the commissioners to bring in the whole of the 50 million gallons per day authorized by the Act of 1855, it is expedient that they should have authority to borrow an additional sum of money. Powers are, therefore, to be asked in the new bill to borrow £450,000, in addition to the sum of £1,400,000 authorized previously.

The new water supply scheme which has been devised by Messrs. J. and A. Leslie for the town of Galashiels, includes a clear water reservoir, capable of holding 6 million gallons; a town cistern, at a high elevation, capable of holding 200,000 gallons of water; a compensation reservoir, capable of storing 17,280,000 cubic feet of water; and about 5¼ miles of piping, the estimated cost of the undertaking being £30,000. This amount, however, does not include a sum of £7000, which will have to be expended in laying pipes in Galashiels.

Five tenders for the supply of the cast-iron pipes required for the Alnwick Hill reservoir, near Edinburgh, were received by the Edinburgh and District Water Trustees. That of Messrs. Cochrane, Grove, and Co., Middlesbrough, —£6 per ton for the pipes, and 10 guineas per ton for the special castings—was accepted. The trustees have resolved to construct a new reservoir at Denscleuch, at an estimated cost of £35,000.

Fifteen offers to construct the new water-works for Burntisland have been received, ranging from £9870 to £13,684. The price of the land is estimated to cost about £4000 additional.

There has been very little alteration in the aspect of the Glasgow pig iron market during the past week. The highest rate was 57s. 3d. cash, and 57s. 4½d. one month; but the market closed on Friday with prices a shade lower.

The coal market has been quiet but steady during the past week. Orders for house coal are slow in coming forward. The shipping trade is not busy, and it will shortly fall off on the east coast, in consequence of the navigation being closed by the approach of winter.

BIRMINGHAM WATER SUPPLY.—Dr. Hill, the Medical Officer of Health for Birmingham, reports that the water supplied by the corporation to that town during September was "turbid, and contained numerous animalculæ and floating particles."

HULL GAS SUPPLY.—Mr. James Baynes reports that the gas sent into the district of Sculcoates and Myton by the British Gas Company during September averaged nearly 16 candles illuminating power. It was at all times free from sulphuretted hydrogen and free ammonia. The results for the month are:

	Max.	Min.	Mean.
Illuminating power standard sperm candles	16·12	15·45	15·95
Grains of sulphur per 100 feet	27·50	19·50	24·00

Mean barometer and temperature in experiment-room:—Bar., 29·84; tem., 62°.

SELBY GAS SUPPLY.—At the meeting of the Selby Local Board, on the 5th inst., the clerk (Mr. G. L. Curtis) read a letter from the gas company, stating that on the terms proposed by the chairman of the board it would be useless on the part of the directors to bring the subject of the purchase of the works by the local board before the shareholders. The chairman (Mr. C. Gallsworthy) said the terms he had mentioned were only based on the supposition, that the nominal value of the works would be perhaps £8000 or £10,000 for the sake of argument. The directors of the gas company had merely been asked if the shareholders would entertain a proposal for the purchase of the works by the board, and if so upon what terms. It was ultimately agreed that the clerk should again address the directors, asking for an answer to his former communication.

SERIOUS ACCIDENT AT THE HYDE GAS-WORKS.—On Wednesday afternoon last a terrific gale of wind passed over the district of Hyde (Cheshire), and resulted in a large amount of damage to property, and in some cases to serious personal injury. We learn from the *Ashton Reporter* that at the gas-works supplying Hyde and the surrounding townships, the principal damage of all was done. The retort-house is about 90 feet long, and is flanked on one side by the cannel stores, and on the other by the purifying blocks. It has a ventilated roof, with an opening half way up, of about three feet. The whole of the body of this roof was iron, with, of course, the usual layer of slates. This iron roof was securely fastened to the brick walls with very strong stapling. The roof was entirely lifted up by the gale, the staples being broken, and after being elevated in the air for a seecnd or two, it fell bodily down. At the time there were about a dozen men in the building. Had it happened a few minutes sooner, the effects would undoubtedly have been more calamitous. The men had just finished charging the retorts, and had gone to wash, and thus escaped. Five men were, however, more or less injured. One of these, named Oldham, was up in the girders of the roof at the time, and another, named Humphreys, was on the top of the retort-beds. They were fixing some scaffolding for repairs. Oldham came down to the ground with the *débris*, but Humphreys was pinned on the top of the retort-beds. Oldham was able to extricate himself with great effort, but it took some time to get Humphreys extricated from the top of the retort-beds. Four of the injured men were able to walk home, but one had to be taken to his residence in a conveyance. Before they were removed Dr. Anderton was called in and examined into their injuries. The news of the catastrophe soon spread, and a crowd rushed to the gas-works to glean information of what had occurred. Messrs. Robert Hall, Z. B. Smith, and J. Cheetham, directors of the company, speedily arrived, and directed operations, which were ably carried out by Mr. William Smith, jun., manager. The condition of the building presented a singular appearance. The iron rafters were lying pell-mell on the floor, mingled with slates, lime, and bricks. The roof of the purifying-room was partially dismantled, and the cannel-house, on the other side, partially damaged. As a proof of the strength or violence of the gale, it may be stated that a large circular iron plate, which was put on to strengthen the wall of the cannel storehouse, was driven through that wall, although it is double the thickness of an ordinary brick wall. It was expected that, notwithstanding this untoward occurrence, the gas company would be able to supply the necessary demand for gas, but they could not accomplish it, for although little injury was done to the retort-beds, the connexions were so far destroyed as to put a stop to work altogether. On Thursday they issued bills announcing that in consequence of the serious damage done to the works by the high wind of the previous day they would be unable to provide a supply of gas for that night. This announcement caused great consternation among the inhabitants. But "it's an ill wind that blows nobody good." The wind was ill in many respects, but it blew favourably for the dealers in "halfpenny dips" and sellers of naphtha. The demand for these was great, but the substitutes, after all, were but poor. The drapers in the town always close their shops on Thursday afternoon, and as far as they were concerned they did not suffer much inconvenience, except in their residences, from the catastrophe. The other shopkeepers, however, fared very differently, and many of them closed their shops when daylight disappeared. Many extemporized every means of showing off their wares. But the attempt was a miserable failure. The "dips," though placed in such a way as to attract, were not attractive, and the town had a very gloomy and uninviting appearance. The street-lamps were, of course, standing in their naked coldness and darkness, and the dim lights that penetrated through the windows only made darkness visible. The inhabitants, however, seemed to put up with their disappointment with a good grace—indeed, they seemed to make fun of the change, and to be highly delighted with their ingenious resources in devising a substitute for gas. In regard to the darkness, or rather want of gas, the same remarks apply to Newton, or the greater portion of it, which is supplied with gas by the Hyde Company.

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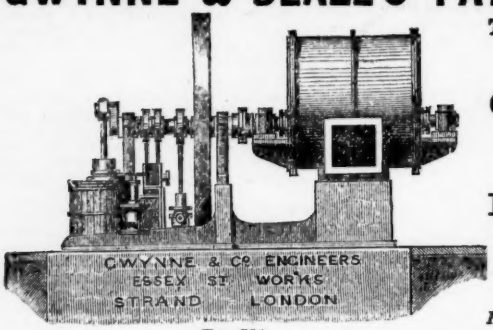

FIG. 224.

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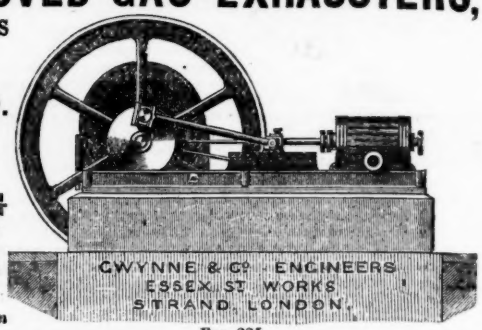

FIG. 225.

Fig. 224 represents one of those erected at the Imperial Gas-Works, Bromley, capable of passing 210,000 cubic feet of gas per hour. Several others of the same size are now on order for the same Company. These Patent Machines combine the highest quality of workmanship and materials, the largest bearings and wearing surfaces, with the **most perfect system of action yet discovered.** Fig. 225 represents one of a series of four at the Nottingham Gas-Works, each passing 52,500 cubic feet per hour. GWYNNE AND CO. *do not pretend to enter into a struggle with other makers in respect to cheapness. They have never sought to make price the chief consideration, but to produce Machinery of the very highest quality, and the most approved design and arrangement.* Their prices have been estimated with a due regard to the **excellence of the article produced,** and when this is taken into consideration, they have no fear for the result. The orders executed this season for Exhausters and alterations to their patented system amount to over 4,000,000 cubic feet of gas passed per hour, and to over 300 horse power for Engines to drive them. In every instance their work is giving the greatest satisfaction. Numerous testimonials and references can be given.

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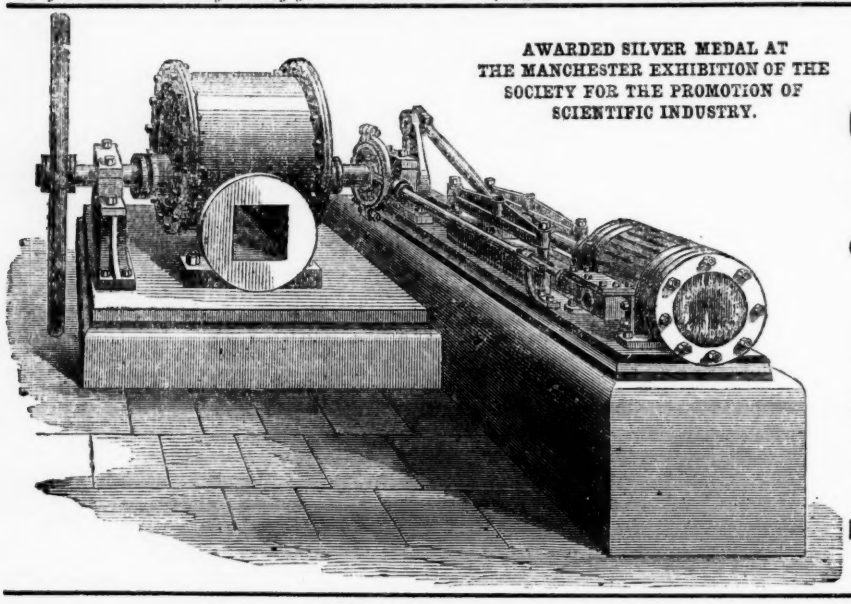

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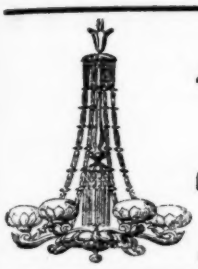

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WANTED immediately, two good STOKERS. Wages 4s. 3d. per day. Those used to an exhauster preferred. Constant employment.

Apply, with testimonials or references, to GEO. SMEDLEY, Manager, Gas-Works, BUXTON, DERBYSHIRE.

WANTED, for about three months, a competent person to undertake the TESTING of GAS-MAINS in a small provincial town.

Applications, with testimonials of competency in similar engagement, stating wages expected, to No. 313, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a situation as Working MANAGER by a practical Man, having had 16 years experience in the manufacture and distribution of gas, setting retorts, laying mains or services, or making any alterations required on a Gas-Work. Good reference as to character and ability can be given.

Address No. 311, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a situation as Working MANAGER of small Gas-Works. Thoroughly understands the manufacture and distribution of gas, retort-setting, main and service laying, meters, &c. Highest testimonials.

Address No. 317, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TO GAS AND WATER WORKS ENGINEERS.

WANTED, a thoroughly practical ASSISTANT ENGINEER, who can prepare finished and working drawings and specifications, and get out quantities and costs, more especially in connexion with small works. Salary £200 a year.

Send fullest particulars of experience to No. 318, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

THE Advertiser, who has had many years experience, and thoroughly understands gas-making, is open to an engagement, either as WORKING MANAGER in a small Gas-Work, or as FOREMAN in a larger factory. He can give the most satisfactory references to his late and present employers.

Address W. COWLING, Gas-Works, Emsworth, HANTS.

GAS-LAMP COLUMNS.

FOR SALE, about 70 cast-iron Lamp-COLUMNS, in thoroughly good condition. Dimensions as follows (or thereabouts), viz.:—Length from roots to cap of base, 5 ft. 11 in.; diameter of ground line of base, 9½ in.; length of column from cap of base to top, 6 ft. 1 in. The column is octagonal, its diameter being 3½ in., tapering to 2¾ in.; weight about 2 cwt. 3 qrs. 14 lbs.

May be seen on application to Mr. GEORGE GOOCH, Gas and Water Company, Poole Hill, BOURNEMOUTH.

TOTTENHAM & EDMONTON GAS-LIGHT and COKE COMPANY.

NOTICE is hereby given that the ANNUAL ORDINARY GENERAL MEETING will be held at the Works, Willoughby Lane, Tottenham, on WEDNESDAY, the 25th day of October inst., at Three o'clock in the afternoon precisely, to receive the Report of the Directors, to declare a Dividend to the 30th of June last, and for the election of two Directors and an Auditor for the ensuing year (Messrs. James Brickwell and William Black being the Directors, and Alexander Nicol the Auditor), who retire by rotation, and, being eligible, now offer themselves for re-election; and to consider the remuneration of the Directors, of which notice was given at the last General Meeting of Proprietors.

The Accounts for the year ended June 30, 1876, have been audited, and will be open to the inspection of Shareholders 14 days prior to date of meeting.

The Transfer Book will be closed on Wednesday, the 11th, until after the Meeting.

After the ordinary business the Meeting will be made Special, for the purpose of considering the issue of the New Capital authorized under the "Tottenham and Edmonton Gas Order, 1876."

By order of the Board,
JAMES RANDALL, Secretary.

Edmonton, Oct. 10, 1876.

Train leaves Liverpool Street Station, G.E.R., 2.7 p.m., due at Park Station 2.37 p.m.

TWELVE Gasholder Columns for Sale, cheap and good, about 30 ft. high by 2 ft. diameter at base, 1 ft. 6 in. at cap. Moulded caps and bases, guide-rails, and brackets complete. Suitable for gasholder 80 ft. to 100 ft. diameter.

Apply to Mr. JAMES HALL, Manager, Gas-Works, St. Helen's, LANCASHIRE.

THE Swansea Gaslight Company have for immediate SALE, the following Plant:—

A 6-h.p. Patent Trunk Engine. (Beale.)
Cylindrical Egg-ended Boiler, 20 ft. by 4 ft. 6 in. (Beale.)
Exhauster to pass 15,000 feet per hour. (Beale.)
An 8-h.p. Grasshopper Engine. (Easton and Amos.)
Cylindrical Egg-ended Boiler, 20 ft. by 4 ft. 6 in. (Easton and Amos.)
Exhauster, 20,000 ft. per hour. (Beale.)
Tar, Liquor, and Water Pumps, Eccentrics, Shafting, and Driving Pulleys.
Wrought-iron Condenser, six vertical Legs, 30 ft. high, 24 in. by 6 in., with tar-boxes, dips, and syphons.
Wrought-iron Scrubber, 5 ft. diameter, 20 ft. high.
Cast-iron Scrubber, 3 ft. diameter, 20 ft. high.
A set of four cast-iron Purifiers, 12 ft. square by 5 ft. deep, with galvanized wrought-iron covers, lifting apparatus, four tiers of wooden sieves, 10-in. connexions and valves.

May be seen at the Gas-Works, Swansea. The whole in perfect working order; replaced by plant of larger dimensions.

Further particulars may be obtained on application to Mr. THORNTON ANDREWS, SWANSEA.

CONTRACTS.

TO CONTRACTORS.

THE Over Darwen Local Board of Health are desirous of receiving TENDERS for the necessary excavations and construction of GASHOLDER-TANK and Retaining Wall.

Plans and specifications may be seen, and full particulars obtained, on application to Mr. John Marsland, Engineer and Manager.

Sealed tenders, endorsed "Tender for Tank," must be sent to me, the undersigned, not later than Friday, the 20th day of October, 1876.

The Board do not bind themselves to accept the lowest or any tender.

CHAS. COSTEKER,
Law-Clerk to the said Board.

Over Darwen, Sept. 27, 1876.

TO GASHOLDER MAKERS, &c.

THE Over Darwen Local Board of Health are desirous of receiving TENDERS for the construction and erection of a Telescopic GASHOLDER, 100 ft. diameter and 22 ft. deep, with guide, framing, &c., complete.

Plans and specifications may be seen, and all particulars obtained, on application to Mr. John Marsland, Engineer and Manager.

Sealed tenders, endorsed "Tender for Gasholder," to be sent to me, the undersigned, not later than Friday, the 20th day of October, 1876.

The Board do not bind themselves to accept the lowest or any tender.

CHAS. COSTEKER,
Law-Clerk to the said Board.

Over Darwen, Sept. 27, 1876.

T. NEWBIGGING,

CONSULTING GAS ENGINEER,

5, NORFOLK STREET, MANCHESTER.

HENRY LYON,

ENGINEER,
AND
CONSULTING GAS ENGINEER,
BROOKLYN, CHEETHAM HILL ROAD,
MANCHESTER.

Mr. ALFRED LASS,

30, GRACECHURCH STREET, LONDON, E.C.,

Is prepared to open the Books, and, if necessary, keep the Accounts of Gas and Water Companies.

To examine the Books and Accounts, and prepare Balance-Sheets for the information of Directors.

To assist Secretaries in preparing Balance-Sheets, according to the "Gas-Works Clauses Act, 1871;" or may be consulted with respect to Accounts generally.

TO INVENTORS AND PATENTEES.

MR. W. H. BENNETT, having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their invention may be secured for Six Months; or LETTERS PATENT, which are granted for Fourteen Years.

Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.

Patents procured for Foreign Countries.

Information as to cost, &c., supplied gratuitously upon application to the Advertiser, 22, Great George Street, WESTMINSTER.

JAMES WHITFIELD,

CLARINGTON BROOK FORGE AND IRON FOUNDRY,

WIGAN, LANCASHIRE.

CAST & WROUGHT IRON WORK,
ALSO
FIRST QUALITY RETORT AND OTHER SHOVELS FOR GAS-WORKS.

JAMES MILNE & SON,

GAS ENGINEERS,

Gas-Meter, Gas Apparatus, and Gas-Fittings Manufacturers,

EDINBURGH, AND

2, KING EDWARD STREET,

NEWGATE STREET, LONDON.

Meter Works in London—2, CROSS STREET, WILDERNESS ROW, E.C.

STATION-METERS, GOVERNORS, CONSUMERS METERS, GAS LUSTRES, CHANDELIERS, BRACKETS, &c.,

And every description of Gas-Fittings and Gas Apparatus.

J. BEALE'S
PATENT
GAS EXHAUSTER.

BEALE'S CONTINUOUSLY ACTING

GAS EXHAUSTERS

ARE NOW MANUFACTURED BY

B. DONKIN & CO.

MR. J. BEALE, of East Greenwich, having retired from business, has made an arrangement with B. DONKIN & CO. for the sole manufacture of his Patent Solid-Slide Gas Exhausters.

B. D. & Co. also make Steam-Engines to drive Gas Exhausters direct or otherwise, and Gas-Valves.

Estimates and Prices on application to

B. DONKIN & CO.,
ENGINEERS & IRONFOUNDERS,
55a, BLUE ANCHOR ROAD, BERMONDSEY,
LONDON, S.E.

J. T. B. PORTER & CO.,

GAS ENGINEERS & MANUFACTURERS,

IRONFOUNDERS AND CONTRACTORS,

GOWTS BRIDGE WORKS,

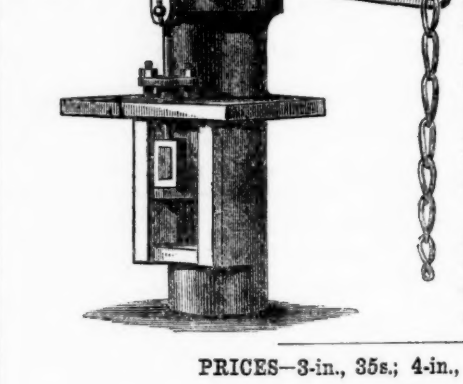
LINCOLN.

ESTIMATES FOR GAS-WORKS OF ANY SIZE.

REFERENCES TO 500 WORKS ALREADY ERECTED.

N.B.—It is most particularly requested that all Communications be addressed to the FIRM ONLY, as circumstances have arisen which render this necessary.

MOORE'S PATENT DIP-PIPE.



THE advantages of this Dip will be seen from the engraving. It is thoroughly effectual in its working, removing the whole of the pressure of the hydraulic main from the retort, thus causing a great saving in gas. It is very easy of manipulation, requiring little care and attention; it cannot get out of order, and, when shut, works as an ordinary Dip-Pipe. No accumulation of carbon in retort. Can be fixed to existing H-pipes.

In ordering the Dip, the distance from top side of hydraulic main to water-level should be stated; also the Dip at which it is required to work when the valve is shut.

PRICES—3-in., 35s.; 4-in., 42s.; 5-in., 48s.

SOLE AGENT: J. GILL, GAS-WORKS, BRIDGENORTH,
To whom all communications should be addressed.

MAKERS: THE COALBROOKDALE COMPANY, SHROPSHIRE.

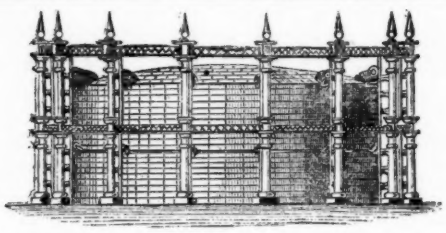
ALFRED WILLIAMS,

PHŒNIX FIRE-BRICK WHARF,

64, BANKSIDE, SOUTHWARK, LONDON, S.E.

GAS ENGINEER AND CONTRACTOR FOR THE ERECTION OF GAS-WORKS,
AND FOR THE
SUPPLY OF RETORTS, FIRE-BRICKS, CAST-IRON MAINS,
AND ALL MATERIALS FOR GAS MANUFACTURE AND DISTRIBUTION.

HOPE IRON WORKS,



STOCKTON ON TEES.

ASHMORE & WHILE,

GAS ENGINEERS & CONTRACTORS,

MANUFACTURERS OF GASHOLDERS,

GAS APPARATUS OF EVERY DESCRIPTION,
Including Improved
Retort-Lids, Boilers, Cast and Wrought Iron Tanks, Iron Roofing, Bridges, Girders,
And GENERAL IRONWORK.

N.B.—Estimates for all Gas Plant and Remodelling supplied on application.

GARSIDE'S IMPROVED MAIN DRILLING CLIP.
No. 1 takes from 2-in. to 6-in. Mains.
No. 2 takes from 6-in. to 12-in. Mains.
GARSIDE'S REGISTERED TUBE-VICE takes ⅝ brass to a 2-in. Socket.
May be had direct from the maker, SAMUEL GARSIDE, Gatefield Iron-Works, ASHTON-UNDER-LYNE.

BIRTLEY IRON WORKS,
CHESTER-LE-STREET,
DURHAM.
Manufactory for every description of Casting and Machinery for Gas-Works and Water-Works.
Warehouse in London for Cast-Iron Pipes and Connexions of all sizes and in any quantity, Scott's Wharf, Bankside, Southwark.
Agent in London, Mr. J. MANWARING, 101 Cannon Street, E.C.

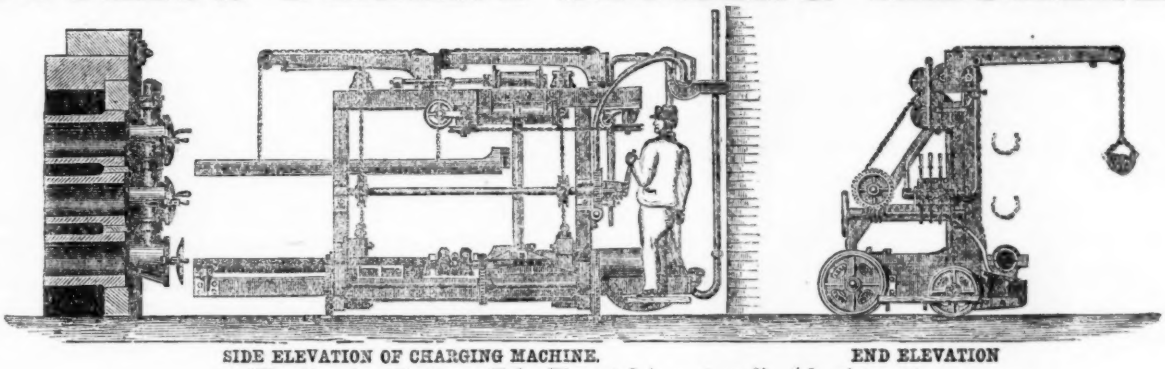
BAILEY'S Patented Inventions are now in extensive use wherever steam is known. Bailey's Patent Steam Gauges, Pyrometers, Water Gauge Cocks, Test Pumps, Fusible Plugs, Steam and Water Valves, Safety Valves, Junction Valves, Pumps, Tell-Tales, Recorders, Lightning Conductors, Electric Telegraphs, Turret Clocks, Steam Joint Cement, Lifting Jacks, Boiler Feeders, Lime Catcher and Separator, Injectors and Ejectors, and every description of first-class Brass Work for Engines and Boilers. Gas-Works Managers who have not our large book should send for it.

16th edition, 1000 engravings, 4to., post free 2s. in stamps, weight 10 oz., cost of production £1000,

BAILEY'S Illustrated Inventions, containing details and prices of goods in our five several departments:—(1) Brass Foundry, Steam Gauges, Indicators, Feeders, and Fittings; (2) Engineers Sundries, Small Tools, and Stores; (3) Machine Pump and Fire Engine; (4) Turret Clock, &c.; (5) Electric Telegraph, A B C Instruments, Bells, and Apparatus.
J. BAILEY and Co., Albion Works, Salford, LANCASHIRE.

SZERELMEY STONE LIQUID,
Which waterproofs and casehardens every kind of masonry, and
SZERELMEY IRON PAINT,
"The only permanent preservative against rust," having enjoyed the approval and recommendation of the most eminent authorities, including SIR CHARLES BARRY, SIR R. I. MURCHISON, PROFESSOR FARADAY, "THE TIMES," "PALL MALL GAZETTE," "ENGINEER," "BUILDING NEWS," "IRON," and very many others.
MESSRS. SZERELMEY & CO.
Need only offer to send prices and particulars of the various kinds. Address
6, MARTIN'S LANE,
LONDON, E.C.

FOULIS'S PATENT STOKING MACHINE.



SIDE ELEVATION OF CHARGING MACHINE. END ELEVATION

(The Drawing Machine will be Illustrated in next week's Advertisement.)

Makers: TANGYE BROTHERS and HOLMAN, London and Birmingham; ADAM WOODWARD and SON, Manchester; ROBERT LAIDLAW and SON, Glasgow; MASCHINENBAU-ACTIEN-GESELLSCHAFT HUMBOLDT, Kalk bei Deutz:
Or all particulars may be had from JAMES WOTHERSPOON, 31, St. Vincent Place, Glasgow.

ALDER AND MACKAY,

GRANGE WORKS, EDINBURGH,

MANUFACTURERS OF

CONSUMERS IMPROVED GAS-METERS;

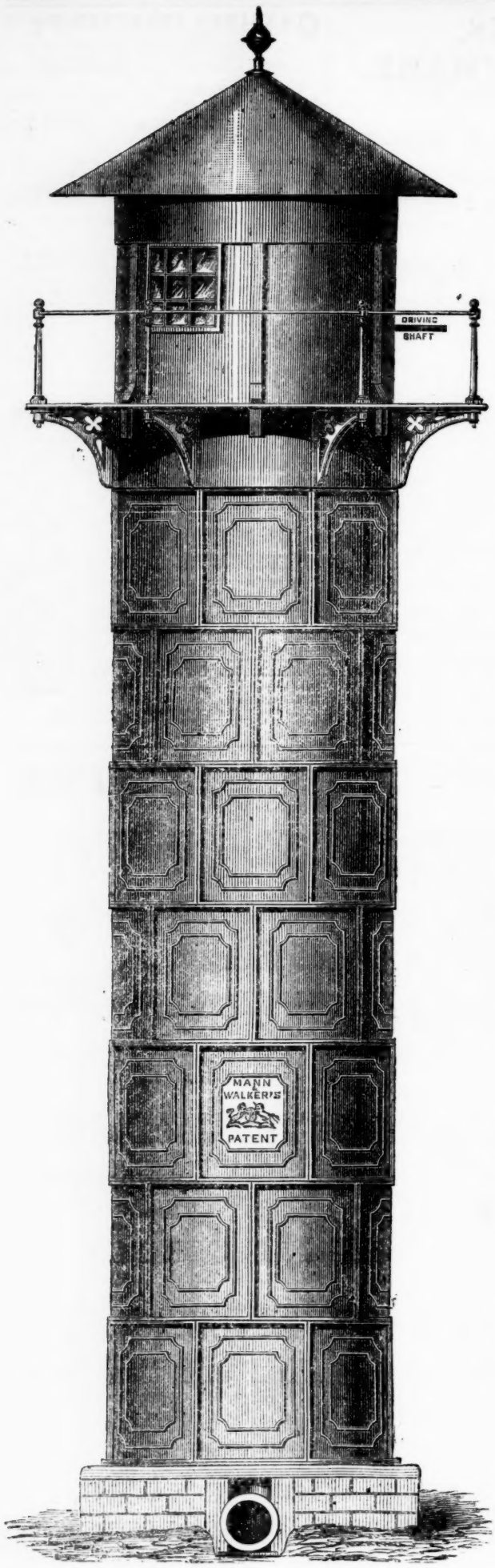
IMPROVED DRY GAS-METERS, in Cast-Iron and Tin Cases,

OF THE HIGHEST EXCELLENCE,

Warranted to measure correctly, and not to vary.

STATION METERS AND GOVERNORS,

EXPERIMENTAL METERS, PHOTOMETERS, GASHOLDERS, &c.



C. & W. WALKER,
8, FINSBURY CIRCUS,
LONDON, E.C.

MANN & WALKERS' PATENT SCRUBBER.

By Letters Patent in Great Britain, Europe, and the United States of America.

By some important improvements recently patented, the purifying power of these Scrubbers has been much increased, and a stronger ammoniacal solution obtained, which is found to absorb a large portion of the carbonic acid contained in gas, effecting an important saving in money and labour in the lime purifiers, and where oxide only is used, the increase in the illuminating power of the gas obtained by these Scrubbers is shown in a remarkable degree, in consequence of the large quantity of carbonic acid removed from the gas.

It is to be particularly noted that the important results of these Scrubbers do not depend upon the machinery alone. The entire internal construction of the Scrubber bears an almost equally important part. For this reason, where it is desirable to convert existing Scrubbers, whose dimensions happen to be suitable, the work commences by ripping out the whole of the interior of the shell, and beginning the internal construction *de novo* from bottom to top.

They are, in all cases, constructed under guarantees to perfectly perform their work. They are now extensively used in the largest gas-works of London and the chief cities of Europe, the number in use exceeds **one hundred,** and their perfect efficiency and profit to a gas company have been fully established with every variety of coal used in Europe. References can be given to the largest gas-works in Europe.

By their use the department of purification from ammonia upon a gas-works is made complete, without the aid of prepared oxide of iron, chemicals in purifiers, or any other supplementary process, and the whole ammoniacal residual product contained in the coal is absorbed and obtained in the form most profitable to a gas company, while the requirements of all Acts of Parliament and of the Board of Trade, relating to incorporate gas companies, are satisfied.

Foul Gas, properly condensed, entering the inlet is, by once only passing through the Scrubber, completely purified from ammonia with regular certainty day by day, without any further trouble, or any other process, effected by a very small quantity of clear water let into the machinery room at the top of the Scrubber, which is discharged at the liquor outlet at the bottom, from Newcastle coal at about 18 to 20 ounces strength, from Yorkshire and other coals, generally from 25 to 30 ounces strength; while acidulated litmus or turmeric exposed at the Scrubber outlet will not show the slightest discoloration, and there is not a quarter of a grain of ammonia per 100 feet left unabsorbed.

They contain their own engine power, requiring only a small inappreciable quantity of steam from the gas-works boiler, and are then complete in themselves, ready for service.

Applications relating to dimensions and prices should be addressed to us, C. AND W. WALKER, 8, FINSBURY CIRCUS, LONDON, E.C., or to Mr. WILLIAM MANN, late Superintendent of the Chartered Gas-Works, BLACKFRIARS, LONDON; they should state approximately the largest make of gas in 24 hours on a winter's day, and the smallest make on a summer's day, to be purified.

J. EDMUNDSON & CO.,

19, GREAT GEORGE STREET, WESTMINSTER,
LONDON, S.W.,

MANUFACTURERS OF EVERY DESCRIPTION OF

GAS APPARATUS.

CONTRACTORS FOR THE

ERECTION OF GAS-WORKS, GAS-FITTINGS, &c.,

FOR TOWNS, COUNTRY MANSIONS, &c.

Estimates given free of Charge.

J. & J. BRADDOCK,

GAS ENGINEERS,

GLOBE METER-WORKS, OLDHAM.

MANUFACTURERS OF

WET & DRY CONSUMERS GAS-METERS,

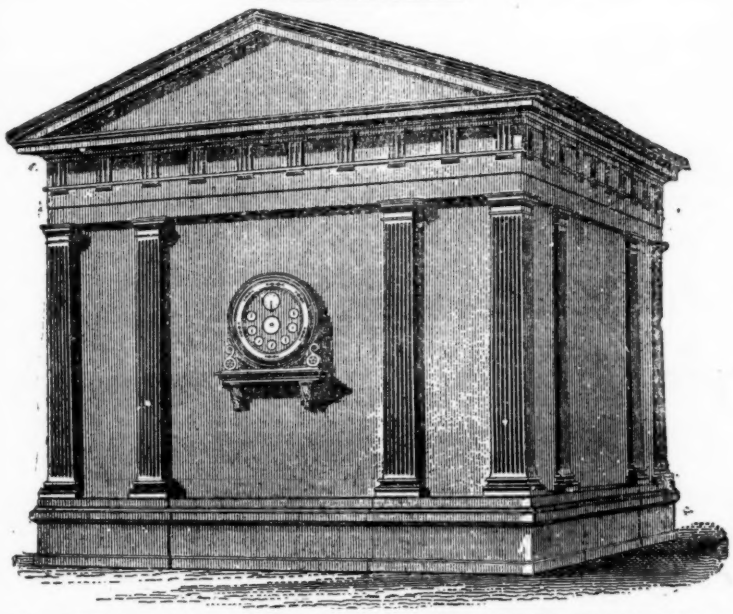
OF THE HIGHEST EXCELLENCE ONLY;

ALSO LICENSEES AND MANUFACTURERS OF

WARNER & COWAN'S PATENT SELF-REGULATING GAS-METERS;

ROUND STATION-METERS,

ON CAST-IRON STANDS.



SQUARE STATION-METERS,

WITH PLANED JOINTS.

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GAS COOKING APPARATUS.

Home and Foreign Orders promptly attended to.

All Sizes of CONSUMERS METERS, STATION-METERS, and GOVERNORS generally in Stock.

Orders almost invariably despatched on the day of receipt.

TERMS, &c., ON APPLICATION.

GEORGE ANDERSON,

GAS AND CONSULTING ENGINEER,

35A, GREAT GEORGE STREET,

WESTMINSTER, S.W.

PATENTEE and MANUFACTURER of the following Inventions:—

RETORT SETTINGS—giving great Economy of Fuel.

STEAM-ENGINES and EXHAUSTERS, FOUR-WAY VALVES.

FUEL-MACHINE, for Compressing Breeze and Tar.

WASHERS, SCRUBBERS, and PURIFIERS, that Economize Space and Cost.

N.B.—Pamphlet, with Eighteen Illustrations of the foregoing, with letterpress on the construction of Gas-Works, post free, 2s. 6d.

SCOTTISH CANNEL COAL SUPPLY

AND

GAS ENGINEERING ESTABLISHMENT,

EDINBURGH.

In consequence of Mr. WILLIAM ROMANS having accepted the appointment of Engineer-in-Chief to the Sheffield Gas Company, the firm of J. and W. Romans, Gas Engineers and Coal Factors, is dissolved, and Mr. John Romans, C.E., F.G.S.E., is again Sole Proprietor.

Mr. Romans, in resuming the direction of this old-established business, desires to embrace the opportunity of inviting the attention of Corporations and Gas Companies to the great importance of a skilful selection of the Cannel and Coal to be carbonized. It is a fact known to those who have patiently manipulated the distillation of gas from Cannel and other Coals, with a view to obtain the highest economic results, that by a judicious intermixture of the lighter with the heavier gases, much of the rich hydrocarbons are saved, which otherwise would be lost during the process of manufacture.

It is with the experience of over 30 years continuous observation to this essential branch of science that Mr. Romans ventures to place at the disposal of his friends, Corporations, and Gas Companies at home and abroad, the practical knowledge he has thus acquired in the basis of gas manufacture and its residual products. Also upon all matters appertaining to the mechanical department of Gas-Works, he is, as a bred engineer, prepared to advise or contract for the supply or repair of the apparatus, or overlook and attest its construction for exportation.

OFFICES:

30, ST. ANDREW SQUARE, EDINBURGH.

N.B.—Mr. Romans has no INTEREST in, nor is he AGENT for, any special Colliery.

TROTTER, HAINES, & CORBETT,

BRETTELL'S ESTATE

FIRE CLAY & BRICK WORKS,

STOURBRIDGE.

Manufacturers of GAS-RETORTS, GLASS-HOUSE FURNACE & BLAST-FURNACE BRICKS LUMPS, TILES, and every description of FIRE-BRICK.

Proprietors of

BEST GLASS-HOUSE POT and CRUCIBLE CLAYS.

Successors to

E. BAKER AND CO., LATE BRIERLEY HILL, STAFFORDSHIRE.

MOBBERLEY & PERRY,

FIRE CLAY and BRICK WORKS,

STOURBRIDGE.

Proprietors of

BEST GLASS-HOUSE POT and CRUCIBLE CLAY.

Manufacturers for Home and Export.

GAS-RETORTS, GLASS-HOUSE FURNACE,

BLAST-FURNACE, TANK BRICKS, LUMPS, TILES,

And Every Description of Best Fire-Bricks.

B. CARPENTER,

(ESTABLISHED MORE THAN 16 YEARS,)

THE ORIGINAL MANUFACTURER OF

WOOD SIEVES

FOR

GAS PURIFIERS & SCRUBBERS.

WORKS:

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LONDON, N.

DEMPSTER'S

RENOWNED

WOOD SIEVES,

WITH TAPER BARS,

MADE BY MACHINERY

CAPABLE OF MAKING 10,000 FEET WEEKLY.

References to Hundreds of First-Class Engineers.

ROSE MOUNT IRON-WORKS

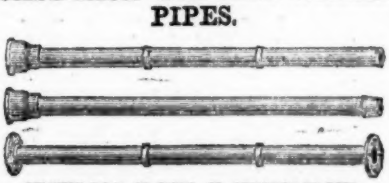
ELLAND, NEAR HALIFAX.

GAS AND WATER PIPES.

WILLIAM MACLEOD & CO.,

18 & 20, ALSTON STREET, GLASGOW.

CAST-IRON GAS AND WATER PIPES.



DELIVERY F.O.B. ON CLYDE, OR STOCKTON-ON-TEES.

Prices on application.

ROBERT MARSHALL,

CANNEL COAL MERCHANT,

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SHOTT'S BOGHEAD.

LOTHIAN'S CANNEL

Yields 12,500 cubic feet of 34-candle gas per ton, and 9 cwts. of excellent coke, containing only 4 per cent. of ash.

MUIRKIRK, No. 1, CANNEL

Yields 12,160 cubic feet of 32·5-candle gas per ton, and 10 cwts. of excellent coke, containing only 5 per cent. of ash.

OLD WEMYSS CANNEL

Yields 13,320 cubic feet of 32·5-candle gas per ton.

Prices and full Analyses on application.

CANNEL COAL.

COPPA COLLIERY, MOLD,

Beg leave to call the attention of Gas Companies to the superior quality of their

CANNEL FOR GAS-MAKING PURPOSES.

This Cannel produces in actual working, in iron retorts, 9200 cubic feet of 32-candle gas, and upwards of 11 cwt. of coke, and in clay retorts will produce 11,500 cubic feet of 25·9-candle gas.

Ports of shipment—Birkenhead or Connah's Quay.

Waggons supplied for delivery by railway to any part of England or Wales.

For particulars, prices, and rates of freight, apply to The Coppa Colliery, Mold, FLINTSHIRE.

JAMES OAKES & CO.,

ALFRETON IRON-WORKS, DERBYSHIRE,

AND

WENLOCK IRON WHARF, 21 & 22, WHARF ROAD, CITY ROAD, LONDON, N.,

Keep in London and at their works large stocks of PIPES and CONNEXIONS (1½ to 36 inches in diameter); also make and supply Retorts, Tanks, Columns, Girders, Special Castings required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

CHARLES HORSLEY, Agent.

ADDISON POTTER,

WILLINGTON QUAY,

NEAR NEWCASTLE-UPON-TYNE,

Manufacturer of

CLAY RETORTS, FIRE-BRICKS, AND EVERY DESCRIPTION OF FIRE-CLAY GOODS

THOMAS CARR & SON,

MANUFACTURERS OF

FIRE-BRICKS, LUMPS, TILES, RETORTS, &c., &c.,

SCOTSWOOD FIRE-BRICK WORKS,

SCOTSWOOD-ON-TYNE.

"SELLARS' CEMENT"

PREVENTS WASTE OF GAS FROM RETORTS;

SAVES CLAY RETORTS FROM DESTRUCTION BY FIRE;

GREATLY ECONOMIZES THE USE OF FIRE-BRICKS;

And PREVENTS ALL POSSIBLE LOSS of GAS FROM LEAKAGE.

J. C. SELLARS,

THE GAS CEMENT WORKS,

BIRKENHEAD.

CATOPTRIC LAMPS.

The NEW PATTERN

Is now placed throughout CHEAPSIDE.

For Terms of Licence to Use and Manufacture, apply to

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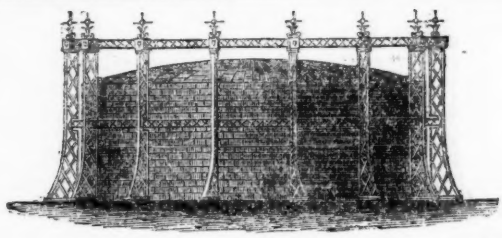

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Analysis by F. J. EVANS, Esq., Chartered Gas Company, Horseferry Road, Westminster:—

(COPY.)

	Cubic Feet of Gas per Ton of Coal.	Illuminating Power in Candles.	Coke per Ton of Coal used.	Ash in Coke, per Cent.	Sulphur in Coal, per Cent.
Silkstone Nuts . . .	10·800	15·85	12·66 cwt.....	6·0	0·69

NOTE.—The illuminating power of the gas was tested by the standard burner now used in London by the Gas Referees, under the City of London Gas Act, 1868.

Horseferry Road, Westminster, March, 1870. (Signed) F. J. EVANS.

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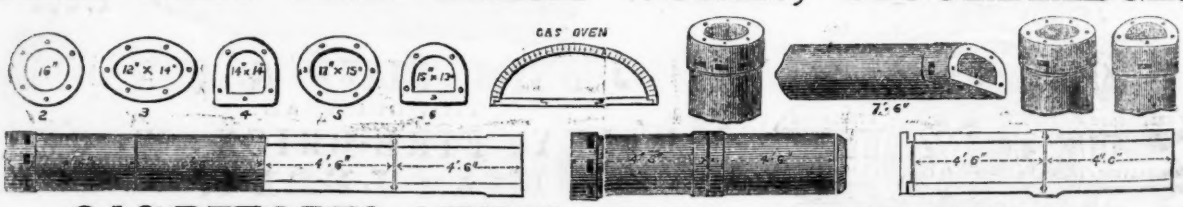

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